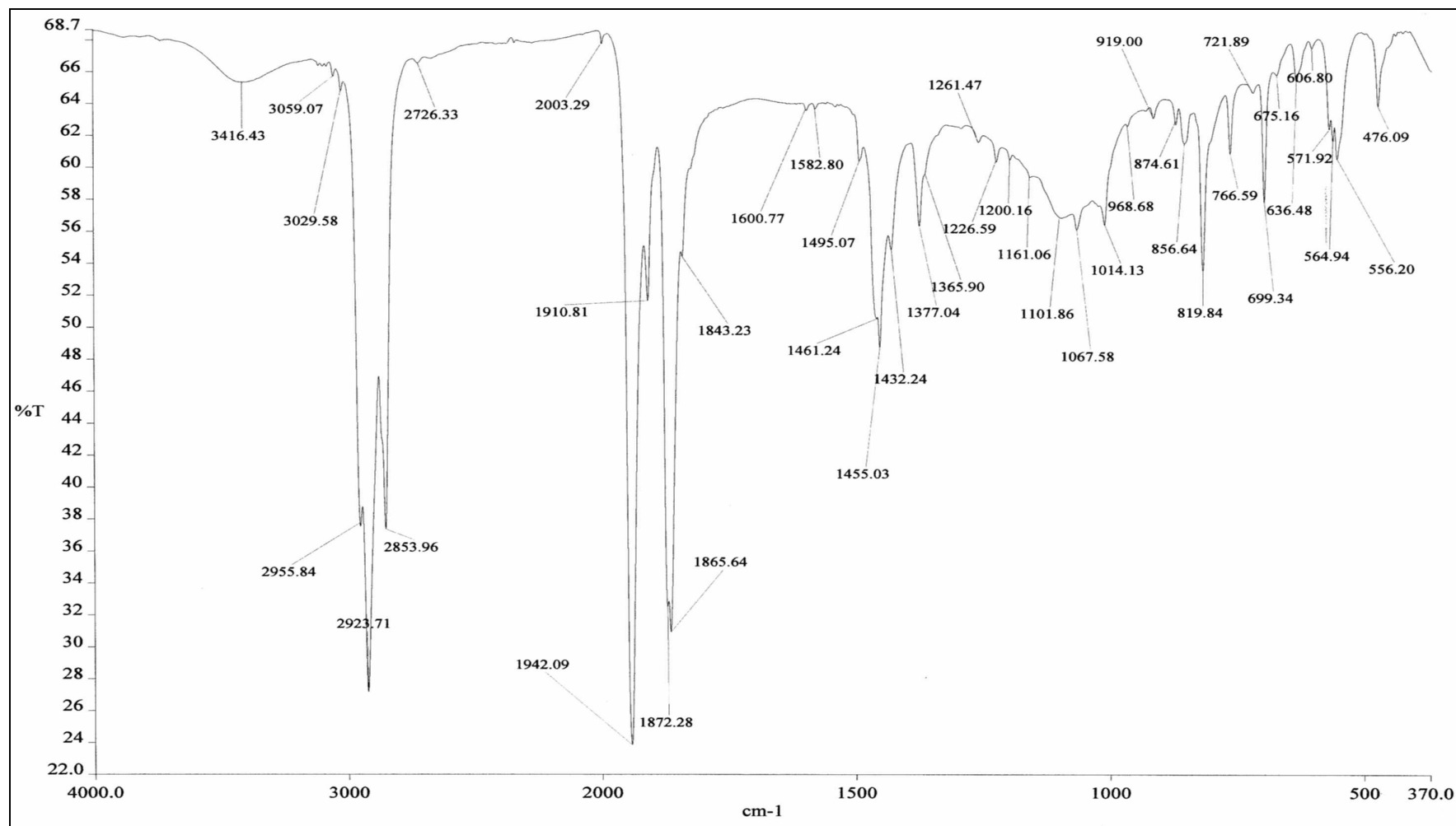
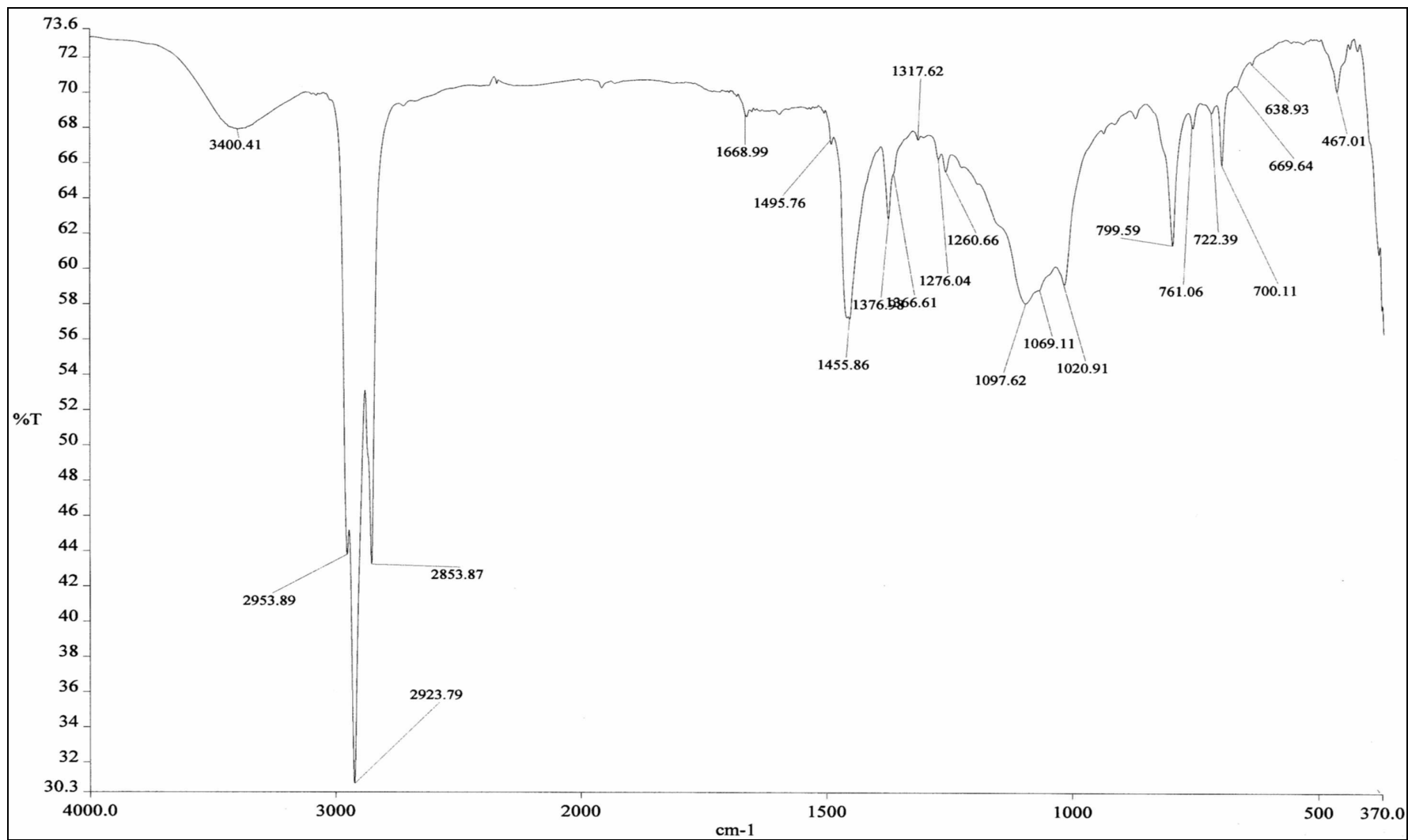


## APPENDIX I

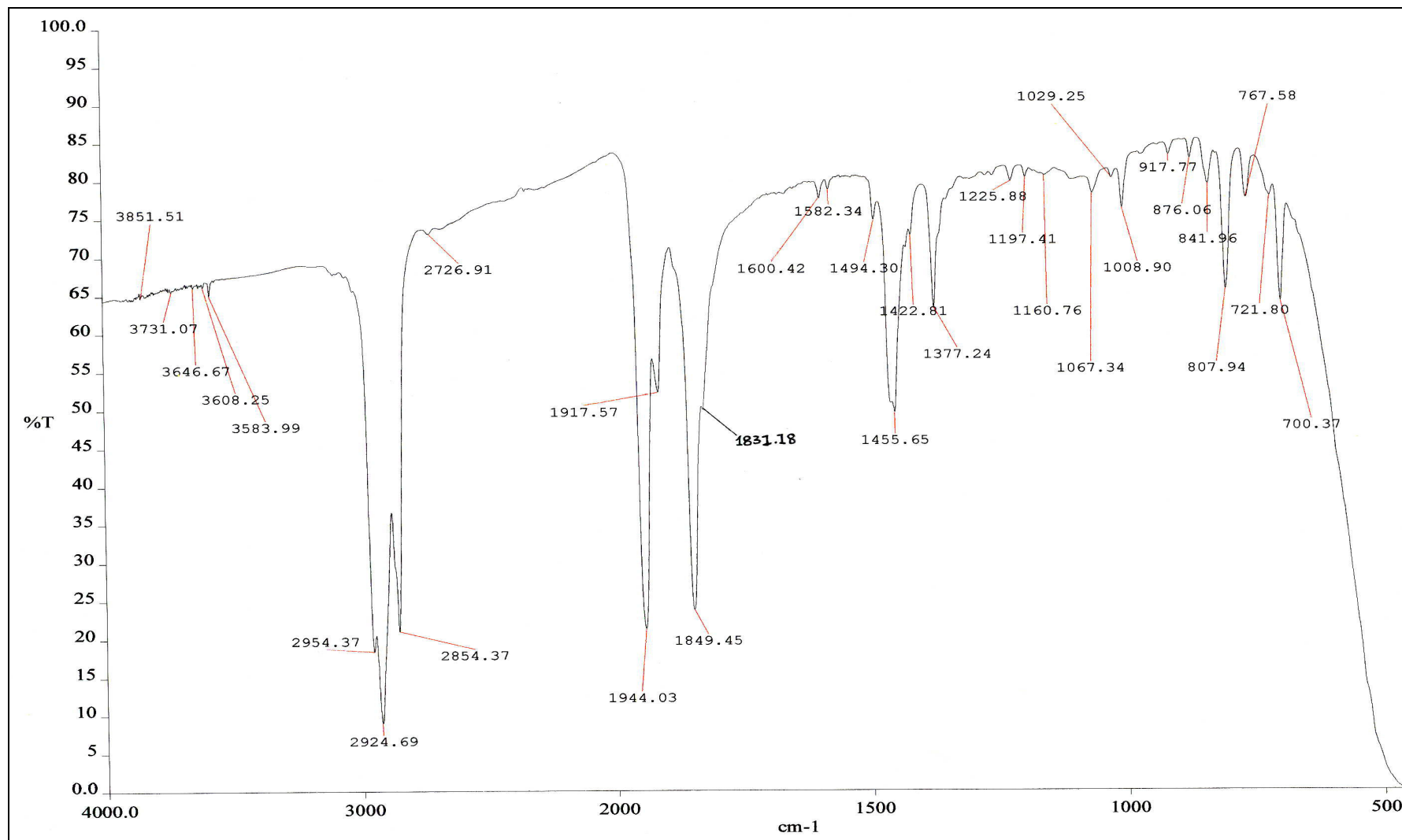
IR spectrum of  $[\text{CpCr}(\text{CO})_2(\text{SBz})]_2$  (**6**) in nujol



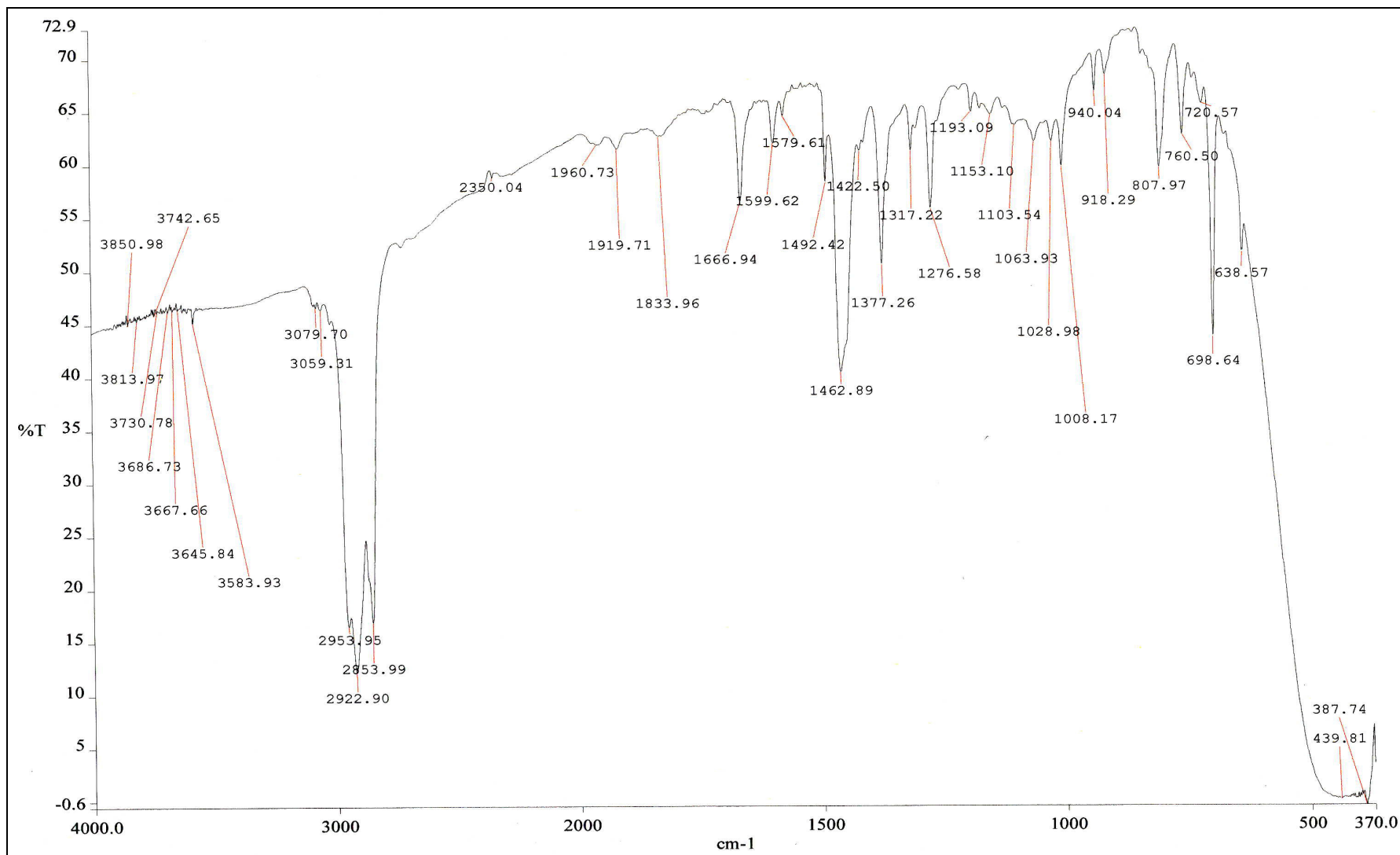
IR spectrum of  $[\text{CpCr}(\text{SBz})_2\text{S}]$  (**7**) in nujol



IR spectrum of  $[\text{CpMo}(\text{CO})_2(\text{SBz})]_2$  (**9**) in nujol

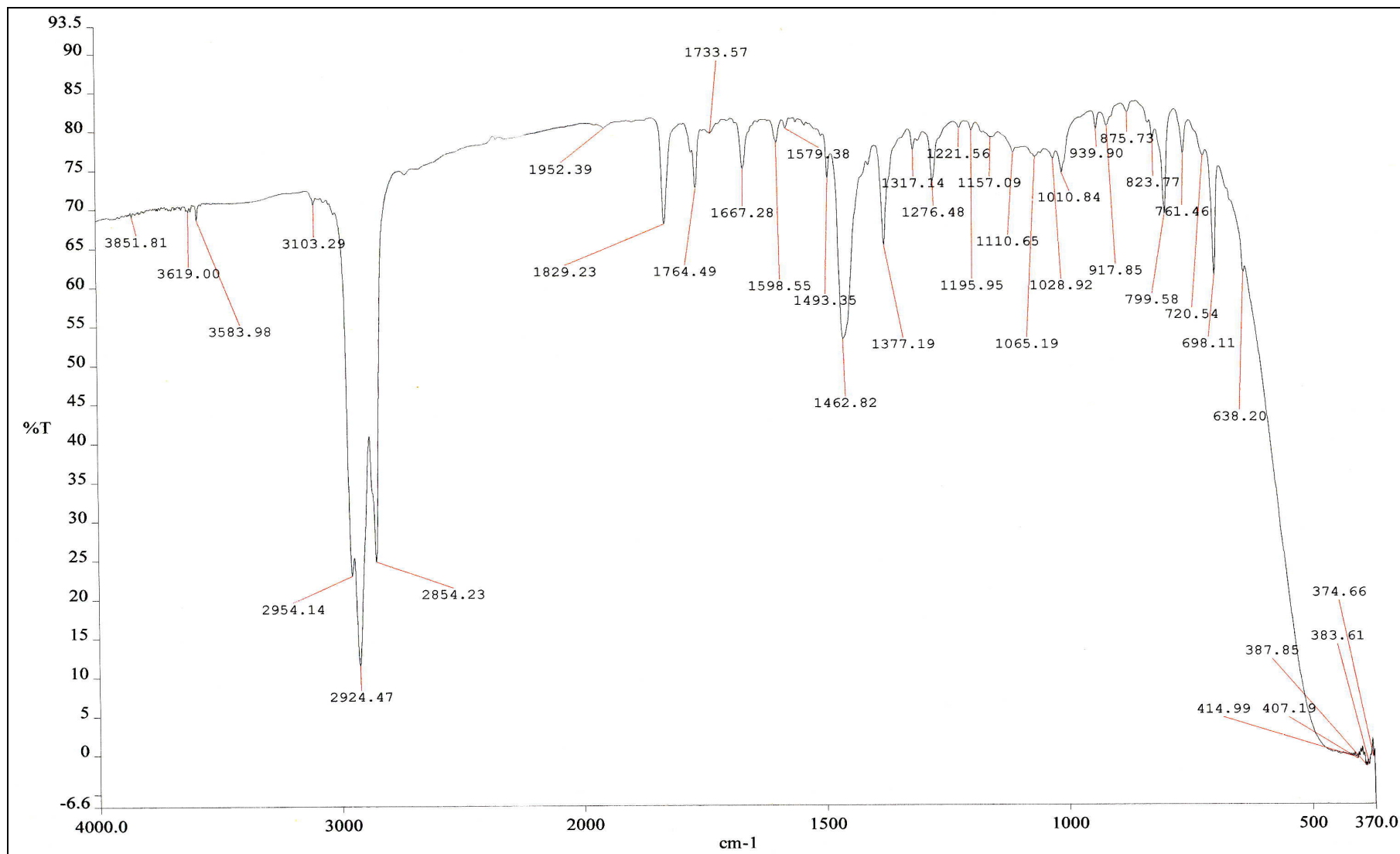


IR spectrum of [CpMo(SBz)S]<sub>2</sub> (**10a**) in nujol

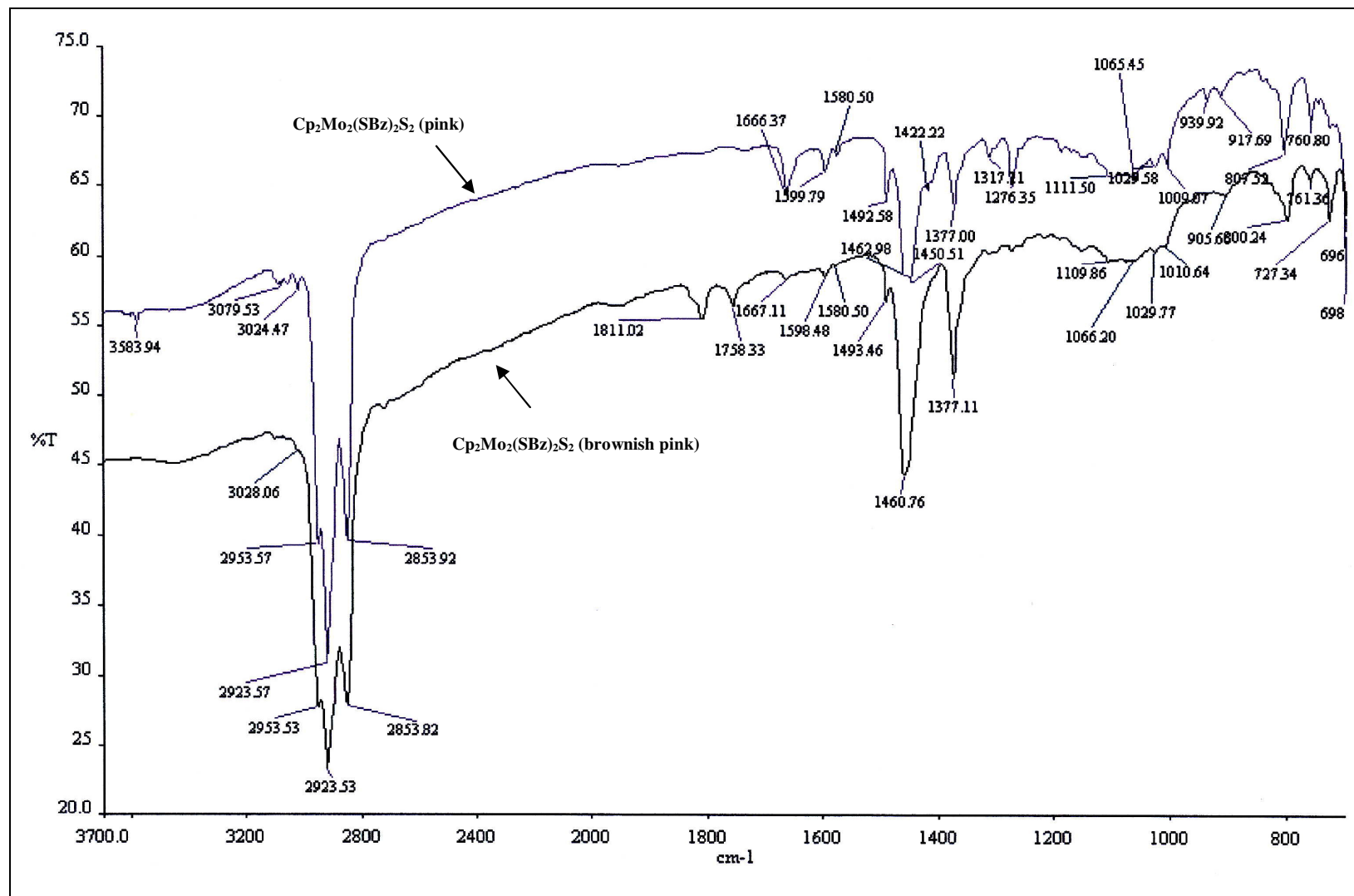




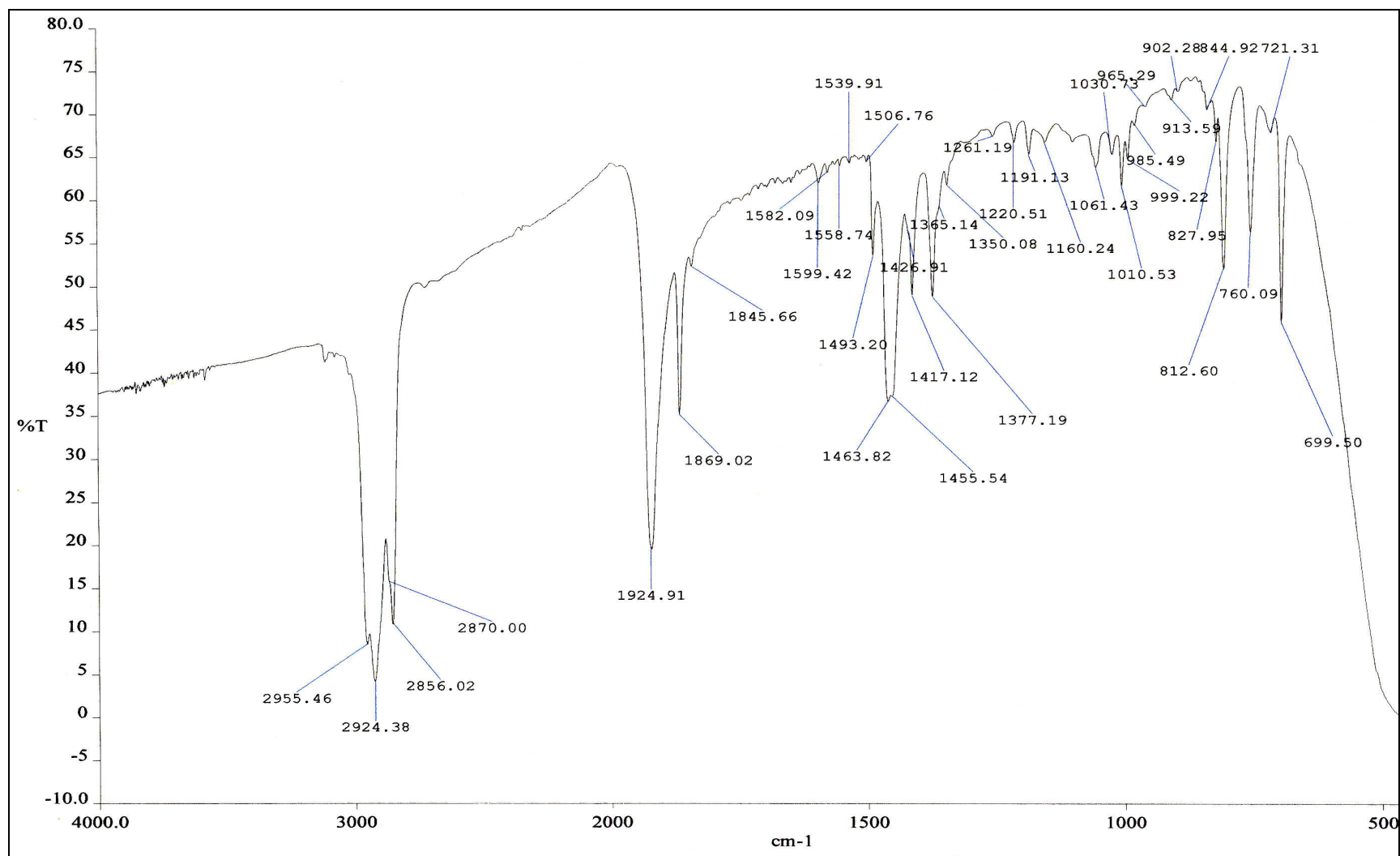
IR spectrum of [CpMo(SBz)S]<sub>2</sub> (**10b**) in nujol



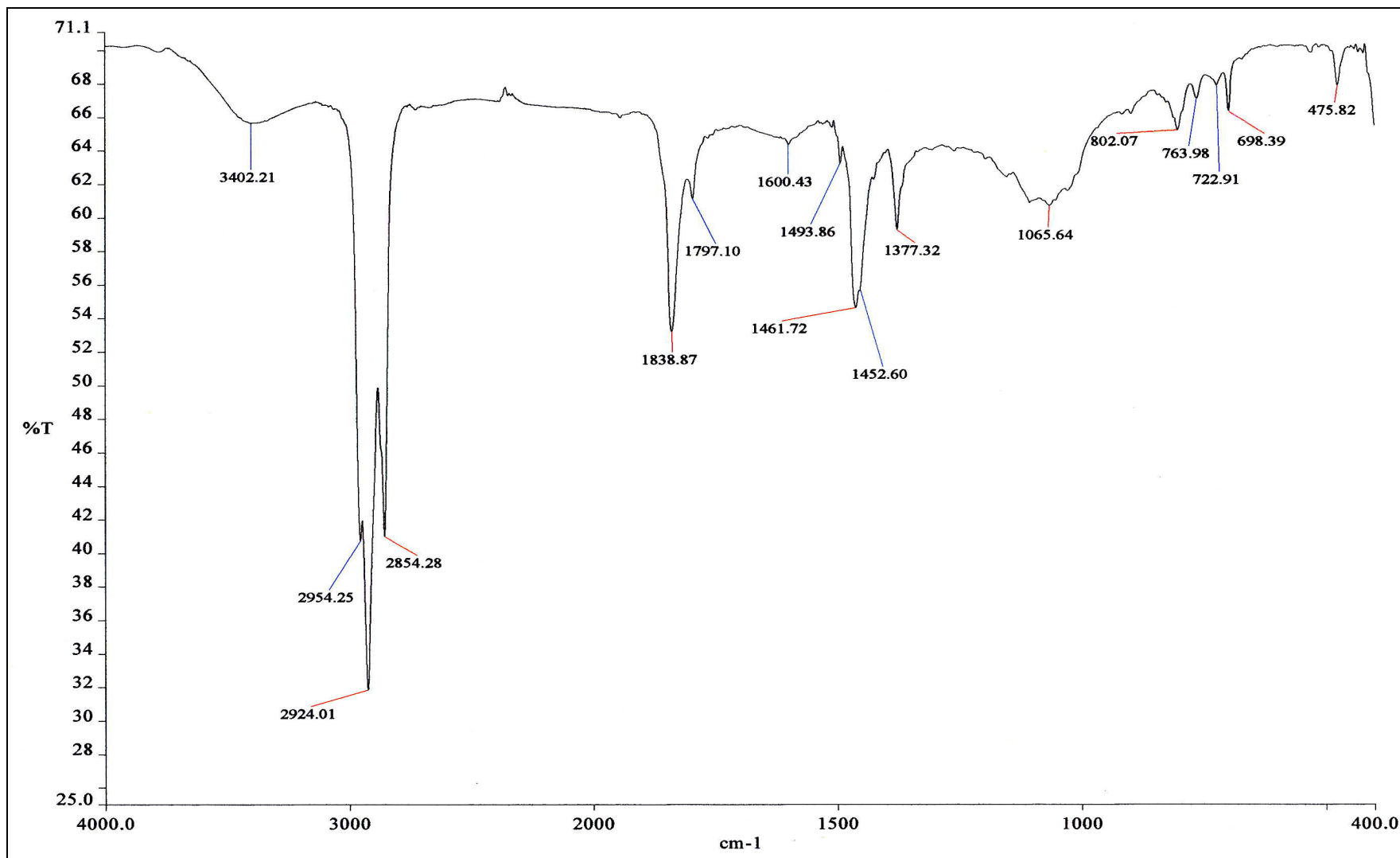
Comparison of IR spectra of polymorph of  $[\text{CpMo}(\text{SBz})\text{S}]_2$  (**10 a & b**)



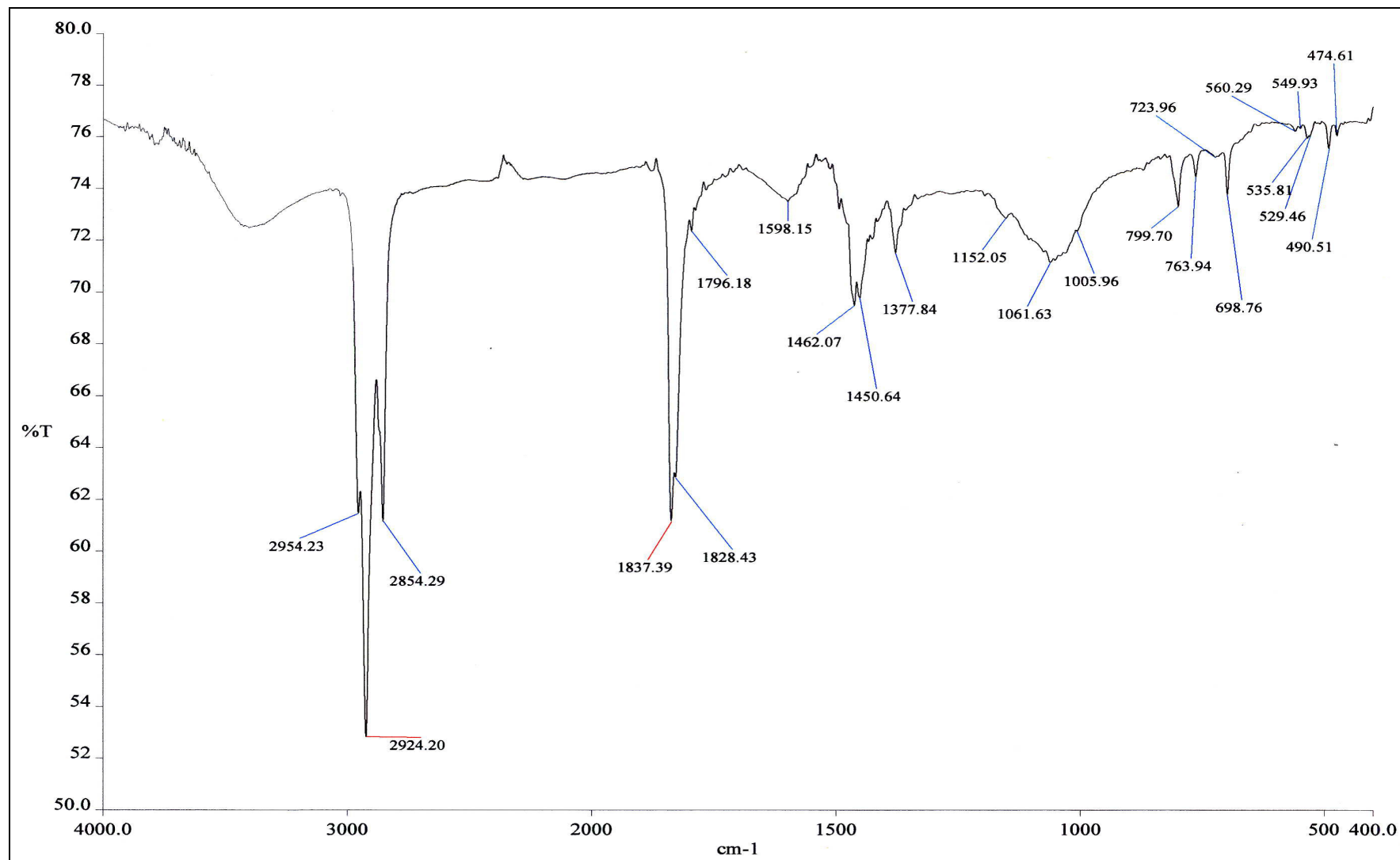
IR spectrum of  $[\text{CpMo}(\text{CO})(\text{SBz})_2]\text{S}$  (**11**) in nujol



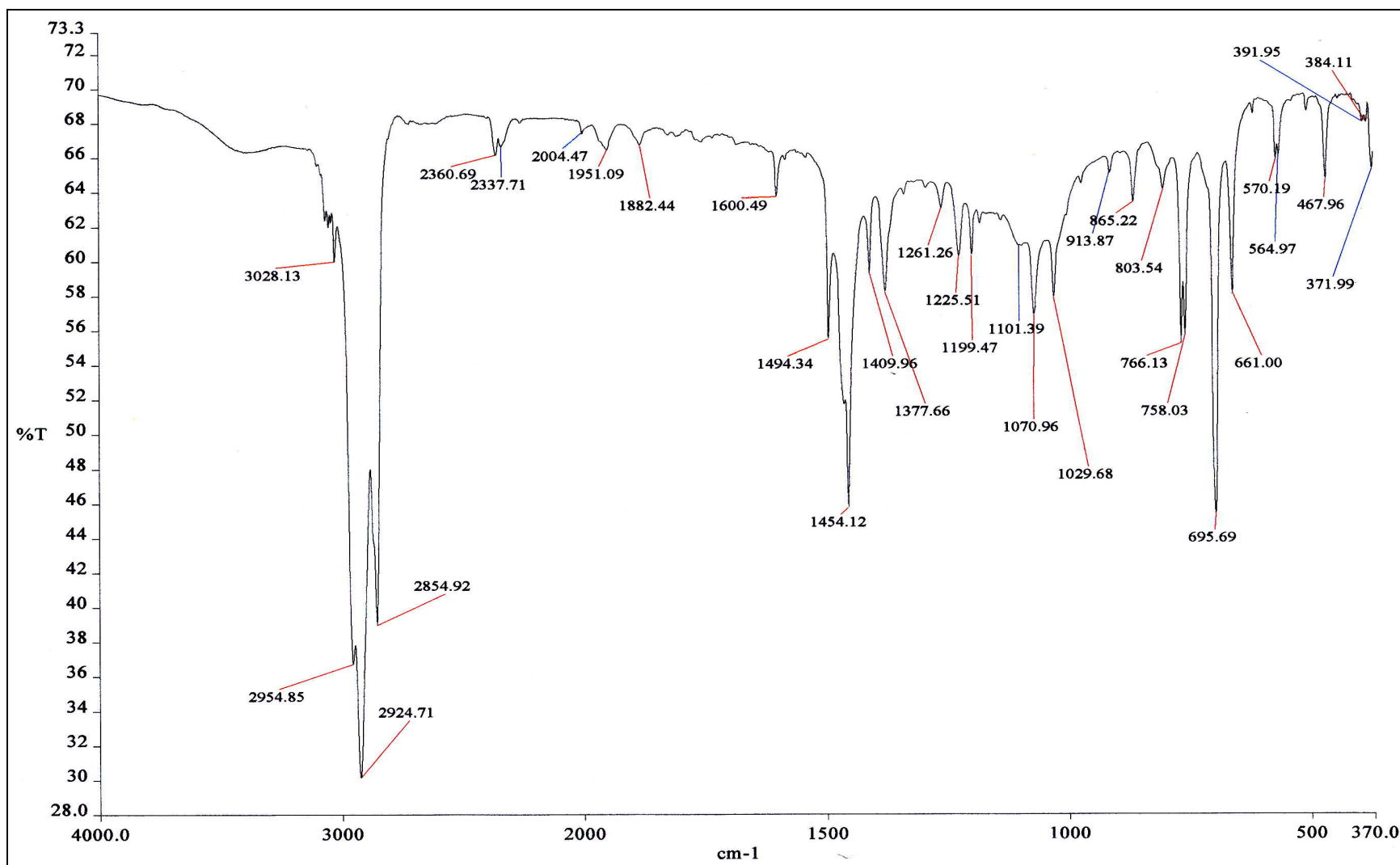
IR spectrum of *trans-syn*[CpMo(CO)(SBz)]<sub>2</sub> (**12a**) in nujol



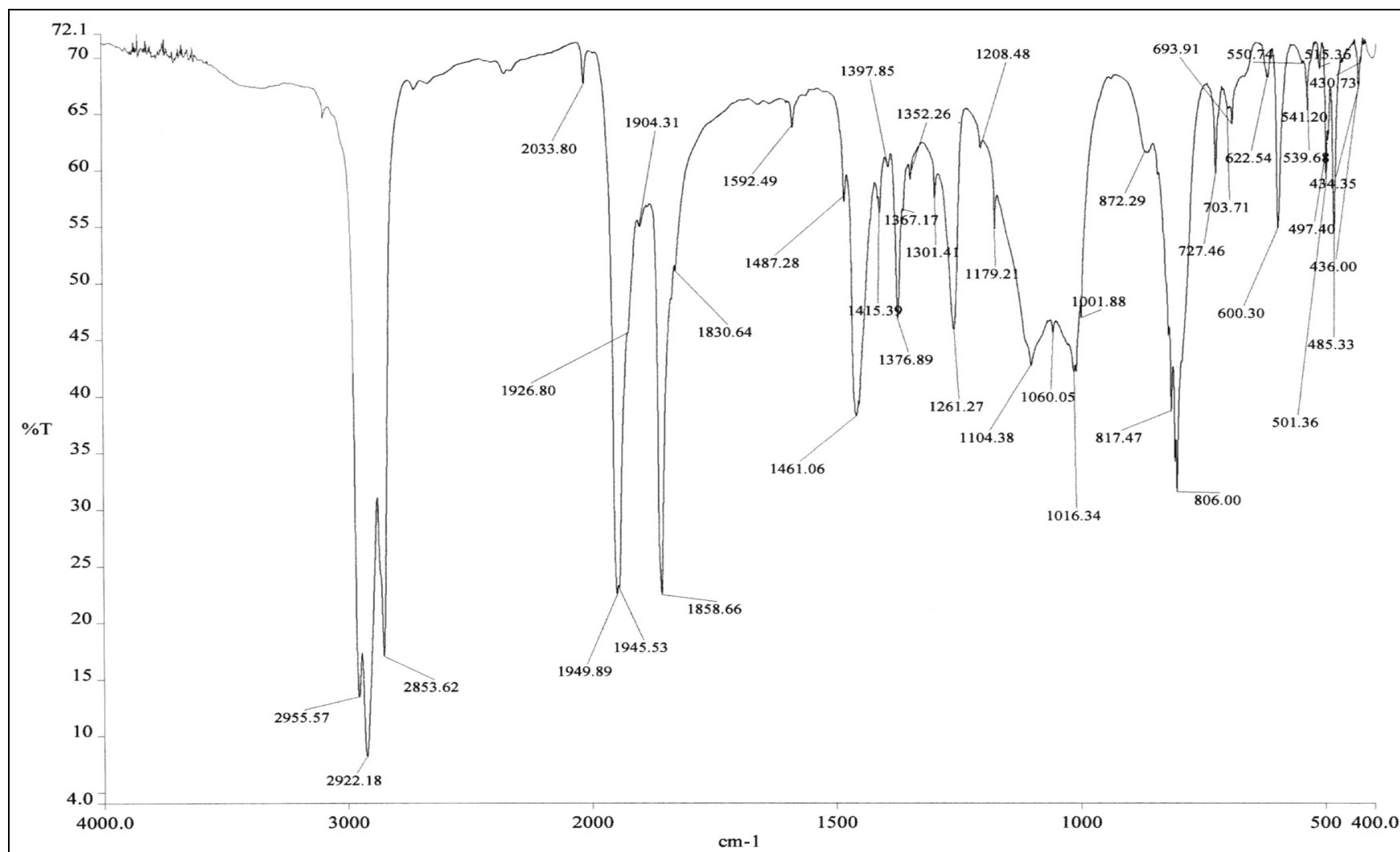
IR spectrum of *trans-anti*[CpMo(CO)(SBz)]<sub>2</sub> (**12b**) in nujol



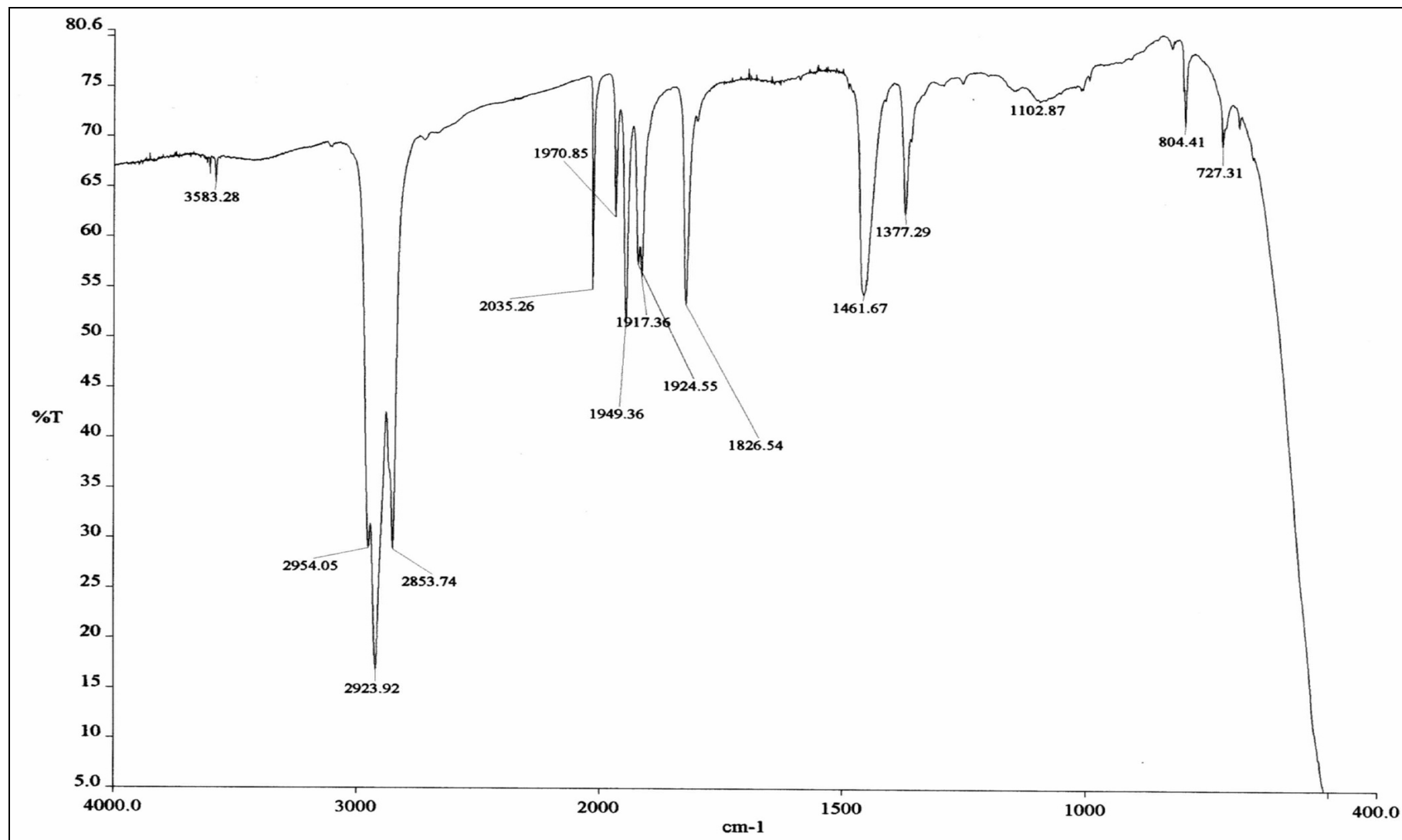
IR spectrum of  $[\text{CpMo}(\text{SBz})_2]_2$  (**13**)



IR spectrum of  $[\text{CpMo}(\text{CO})_2(\text{S}_2\text{P}(\text{SC}_6\text{H}_4\text{Me})_2)]$  (**14**) in nujol

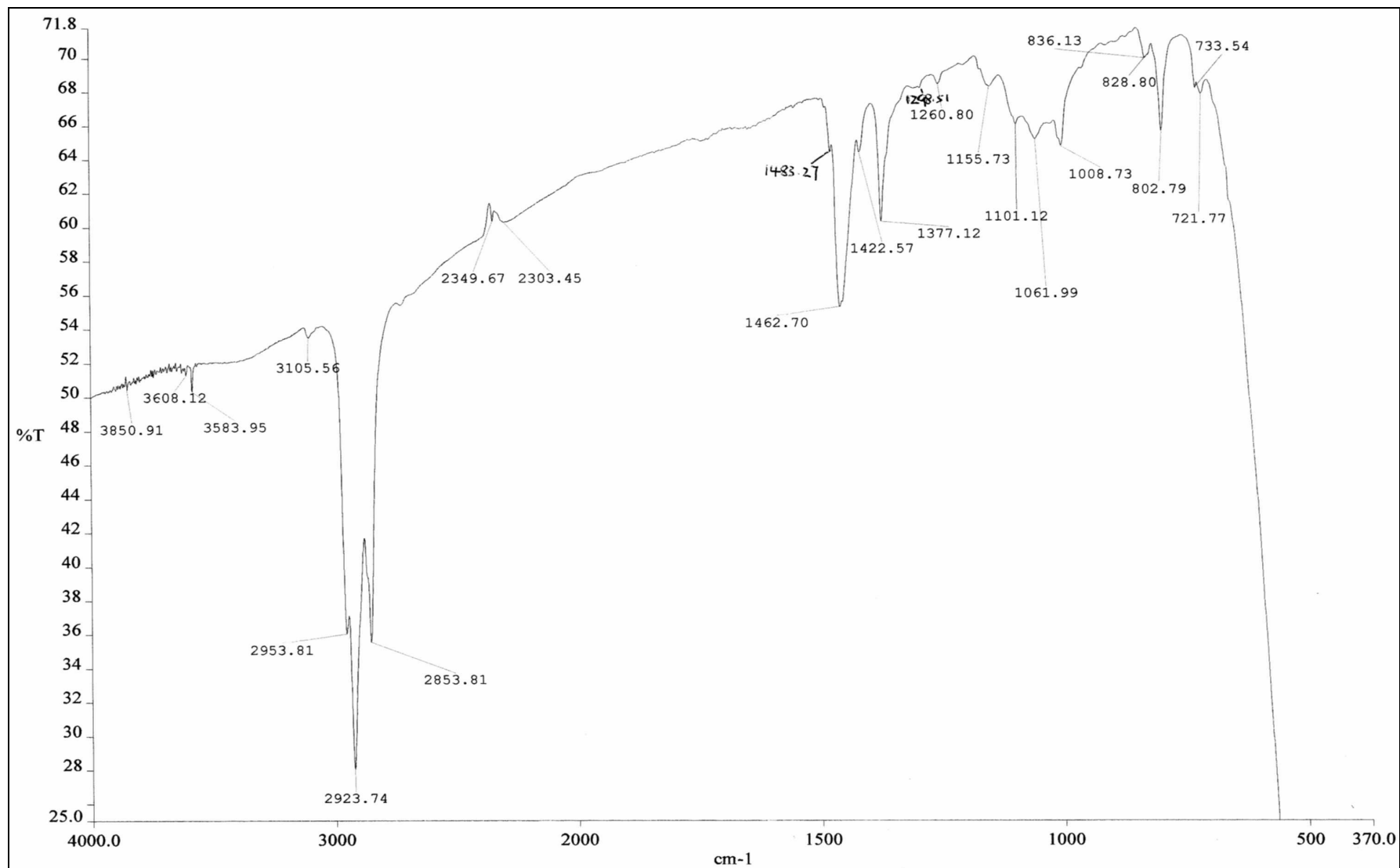


IR spectrum of  $\text{Cp}_2\text{Mo}_2(\text{CO})_5(\text{S}_2\text{P}(\text{SC}_6\text{H}_4\text{Me}))$  (**15**) in nujol

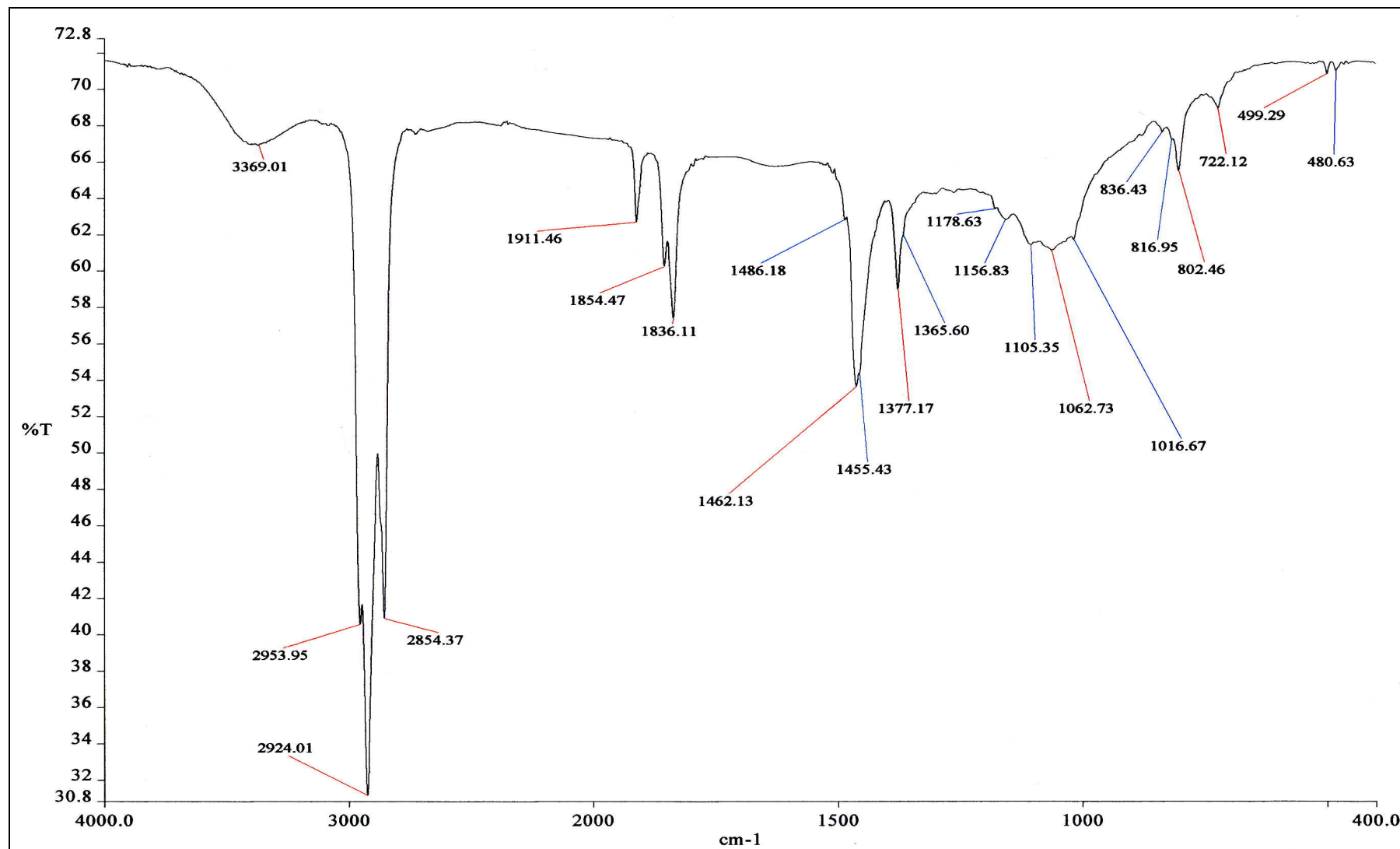




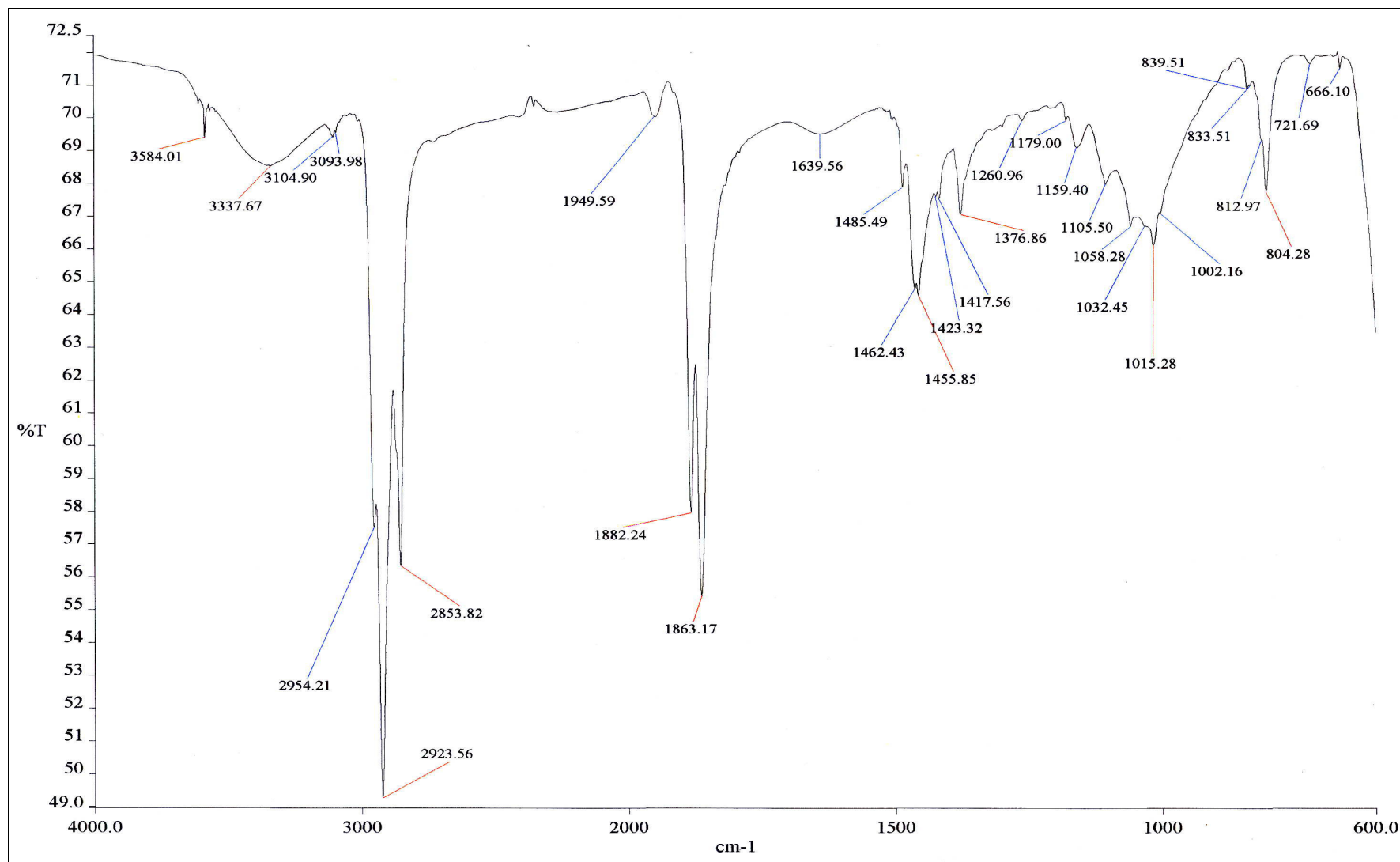
IR spectrum of  $[\text{Cp}_2\text{Mo}_2(\mu\text{-S})(\mu\text{-S}_2)(\mu\text{-SC}_6\text{H}_4\text{Me})]$  (**16**) in nujol



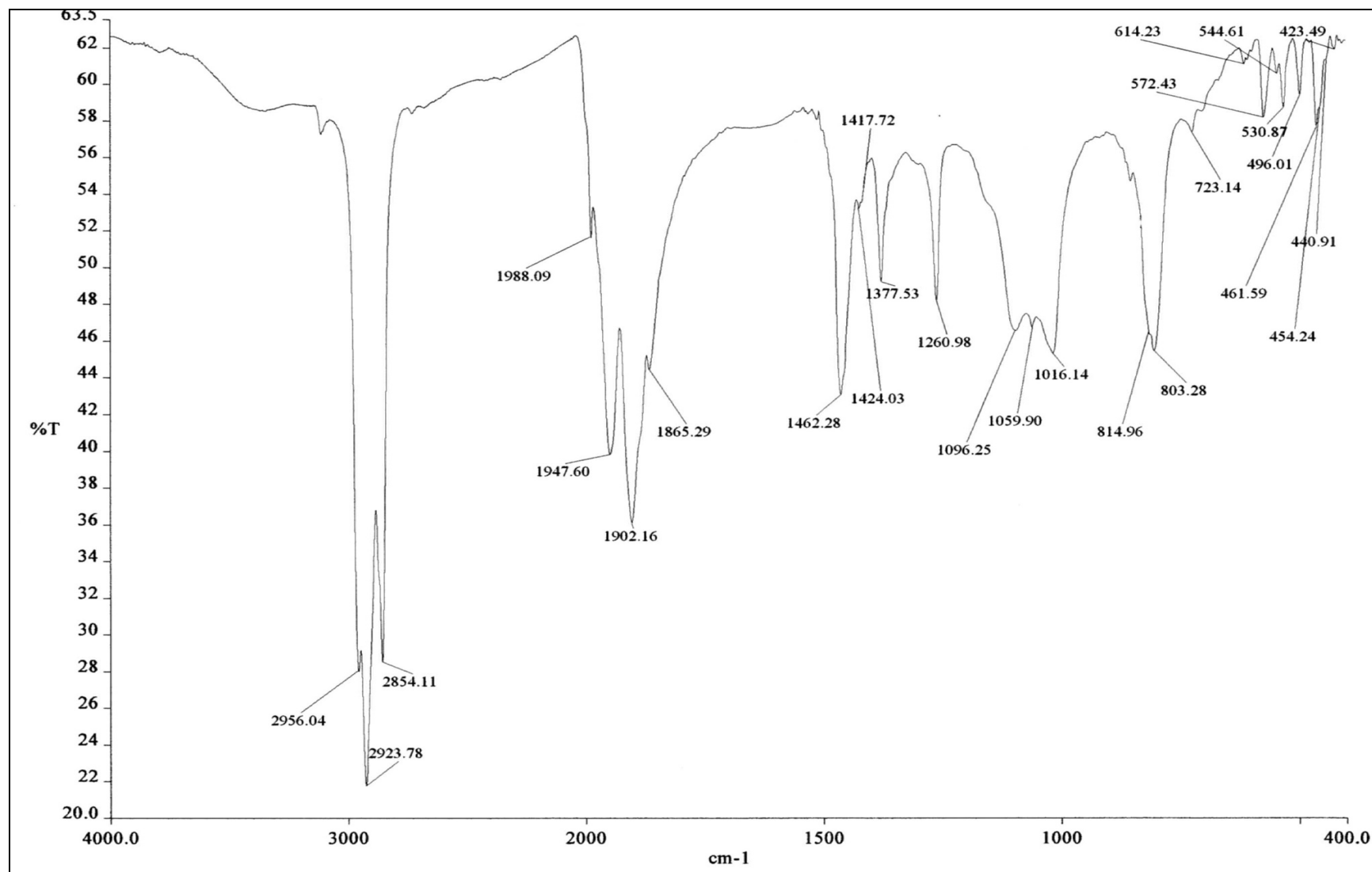
IR spectrum of *Trans-syn/trans-anti* [CpMo(CO)(SC<sub>6</sub>H<sub>4</sub>Me)]<sub>2</sub> (**17a & b**) in nujol



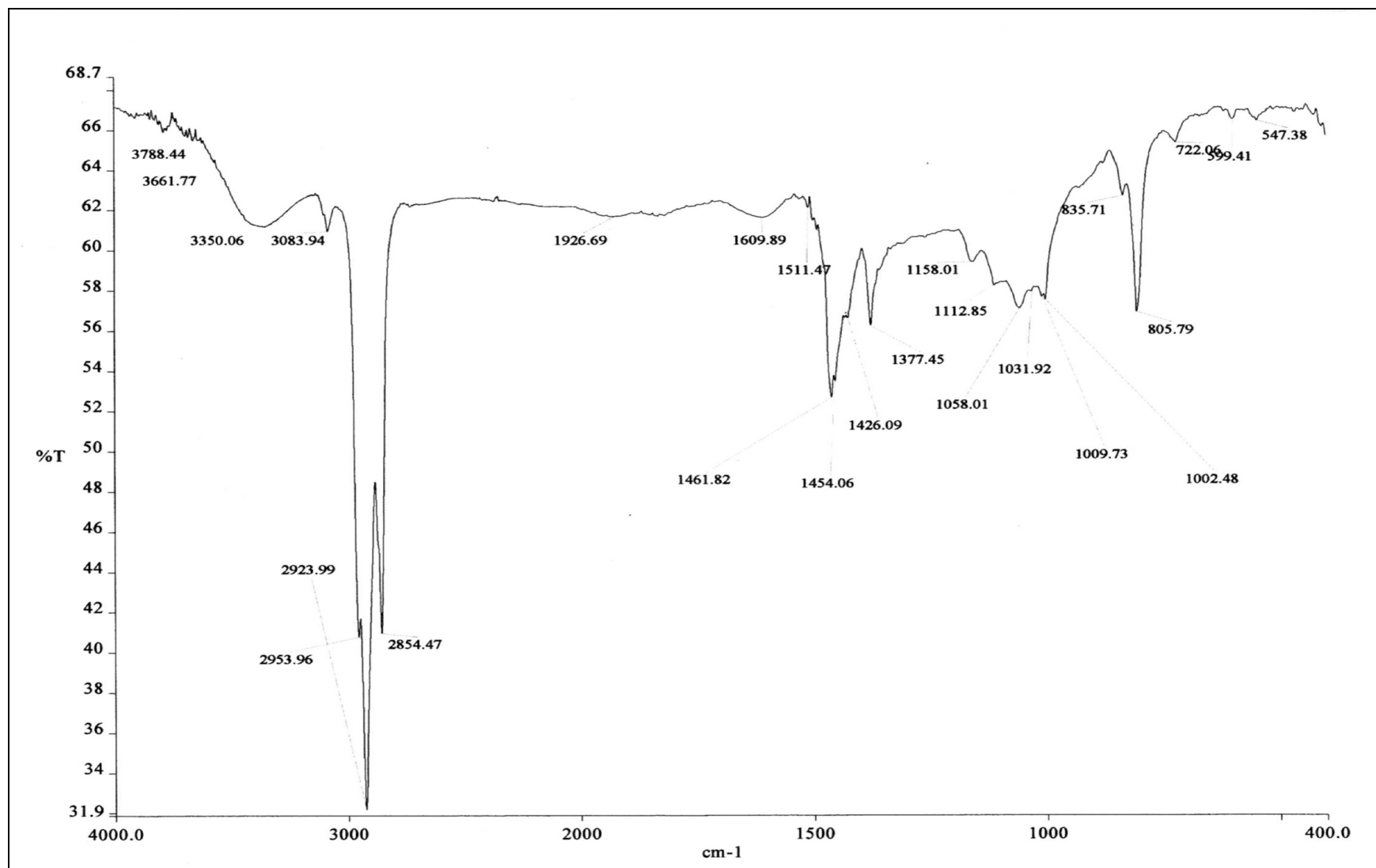
IR spectrum of  $\text{Cp}_2\text{Mo}_2(\text{CO})_2(\mu\text{-PS})(\mu\text{-SC}_6\text{H}_4\text{Me})$  (**18**) in nujol



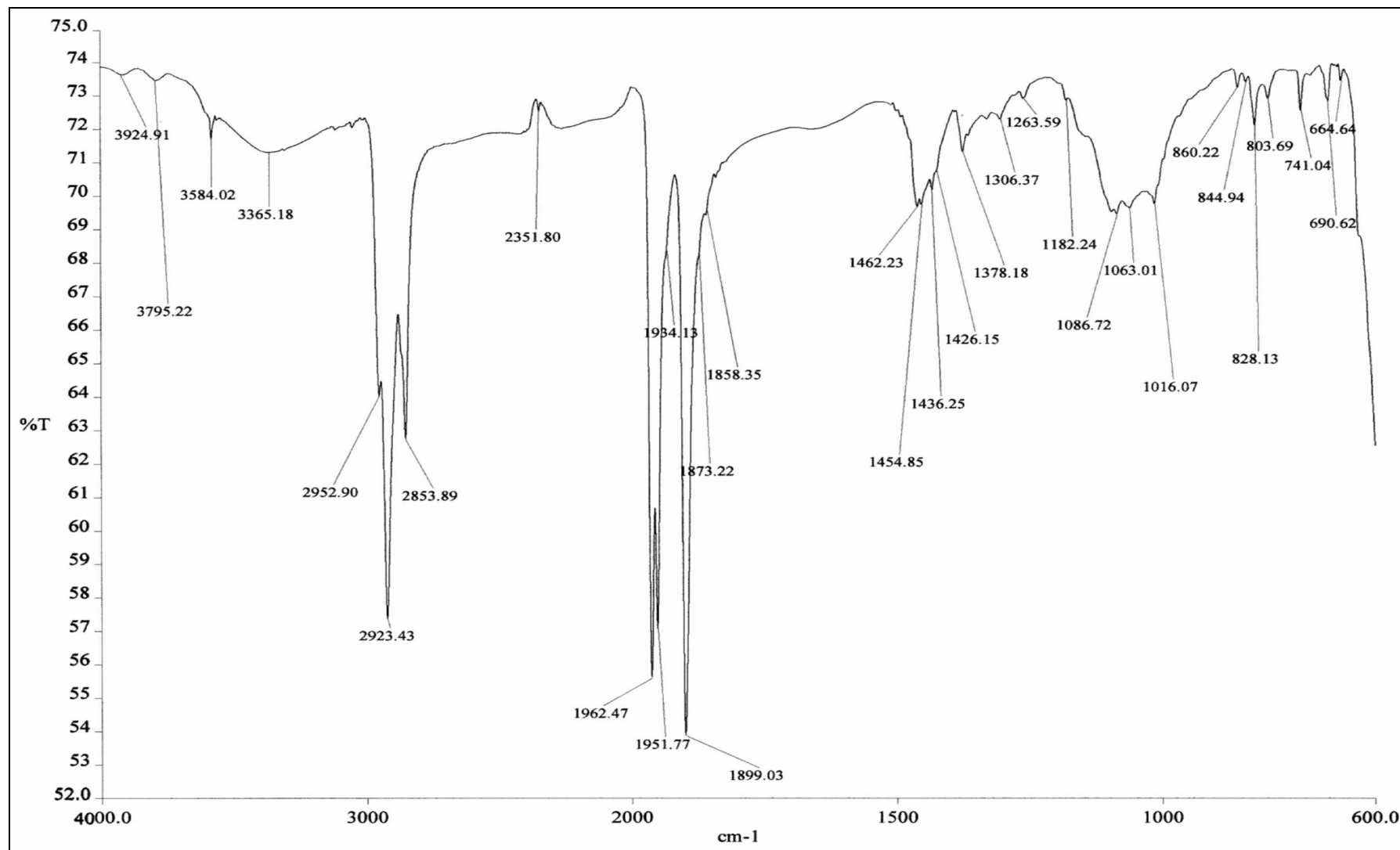
IR spectrum of  $[\text{CpMo}(\text{CO})_2(\mu\text{-S})]_2$  (**19**) in nujol



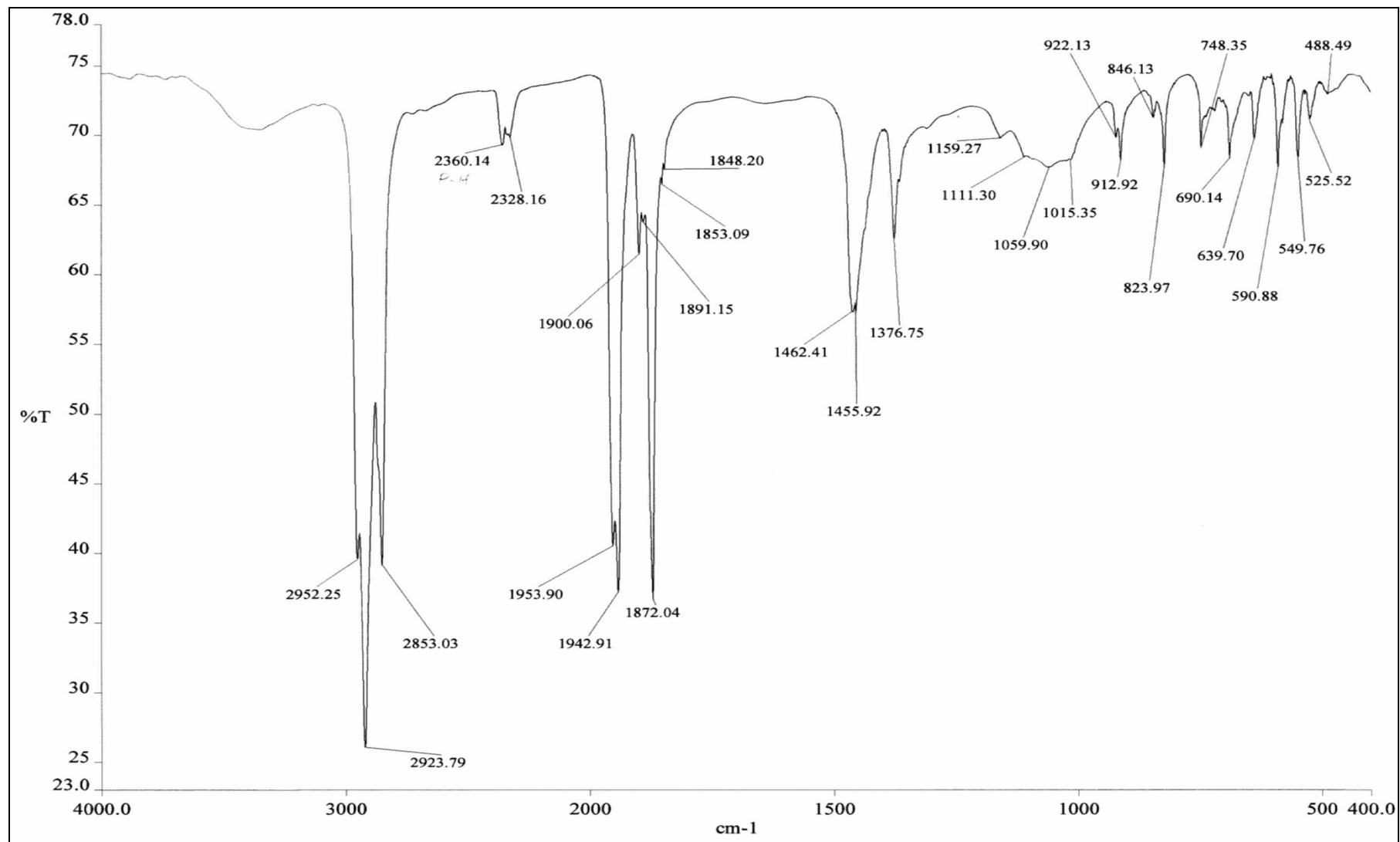
IR spectrum of  $\text{Cp}_3\text{Mo}_3(\mu\text{-S})_2(\mu\text{-S}_2)(\mu_3\text{-S})$  (**20**) in nujol



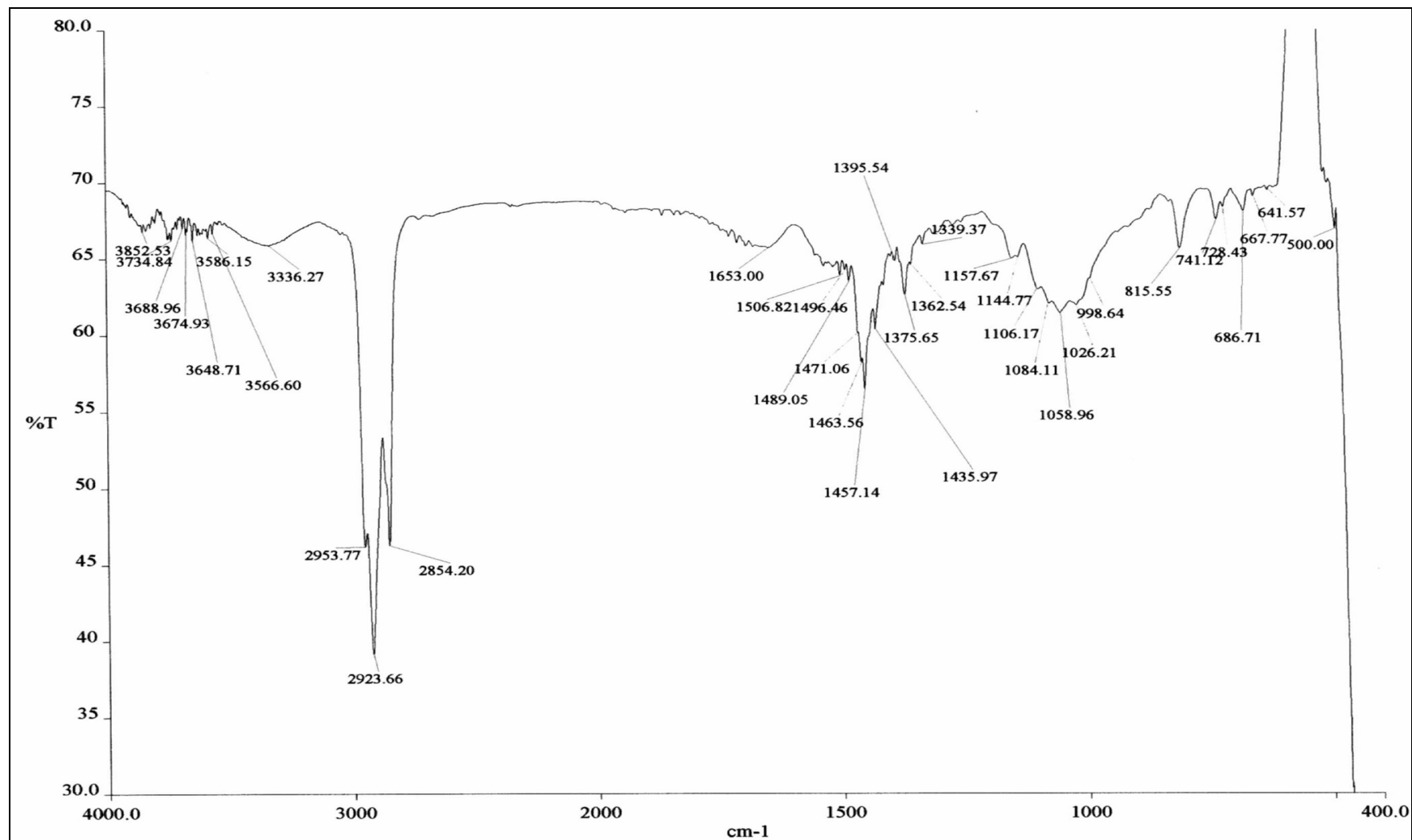
IR spectrum of *trans*-[CpCr(CO)<sub>2</sub>(SePPh)<sub>2</sub>] (22) in nujol



IR spectrum of  $\text{CpCr(CO)}_2\{\text{SeP(H)Ph}\}$  (**23**) in nujol

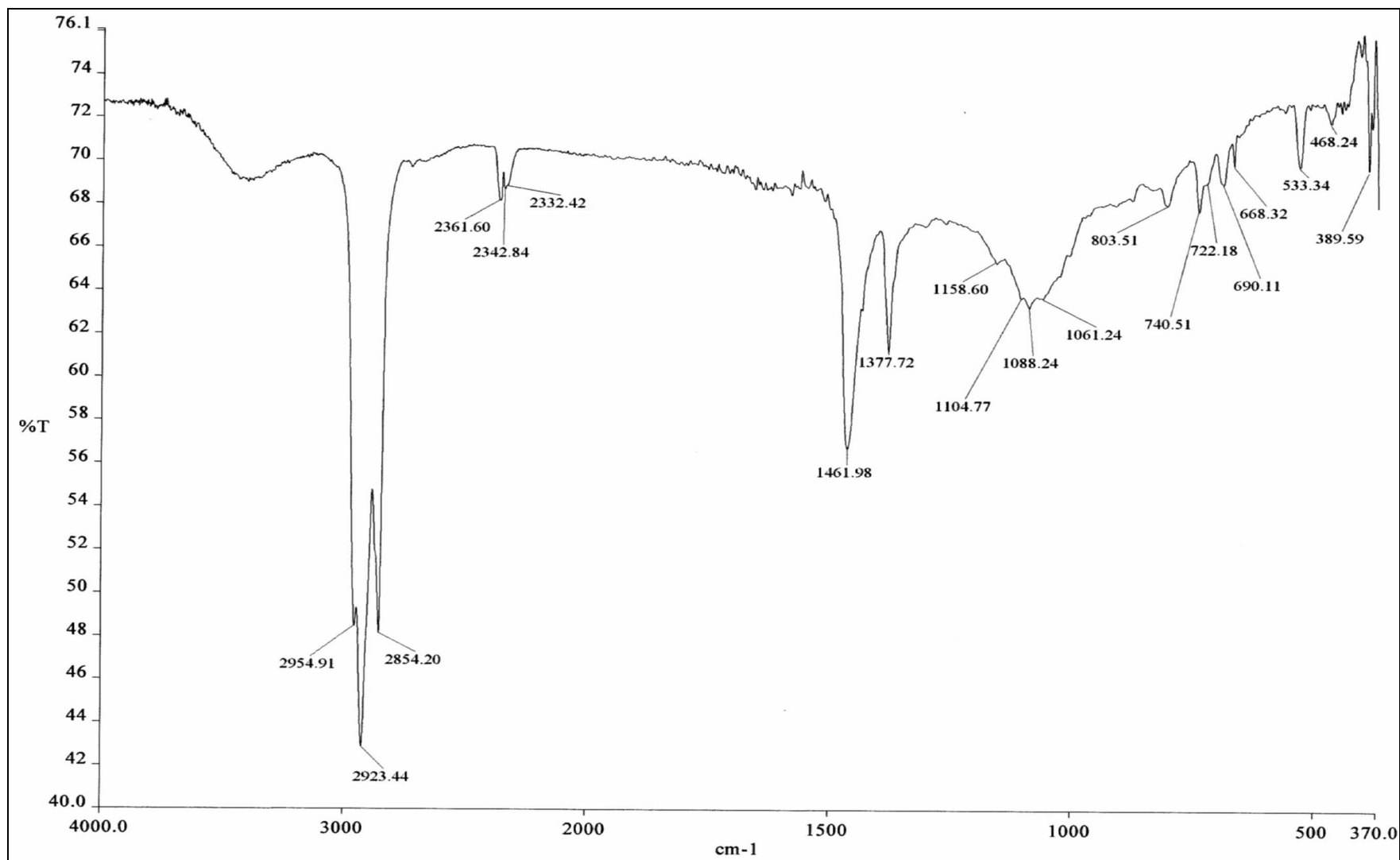


IR spectrum of  $[\text{CpCr}(\text{Se}_2\text{P}(\text{O})\text{Ph})_2]$  (**24**) in nujol

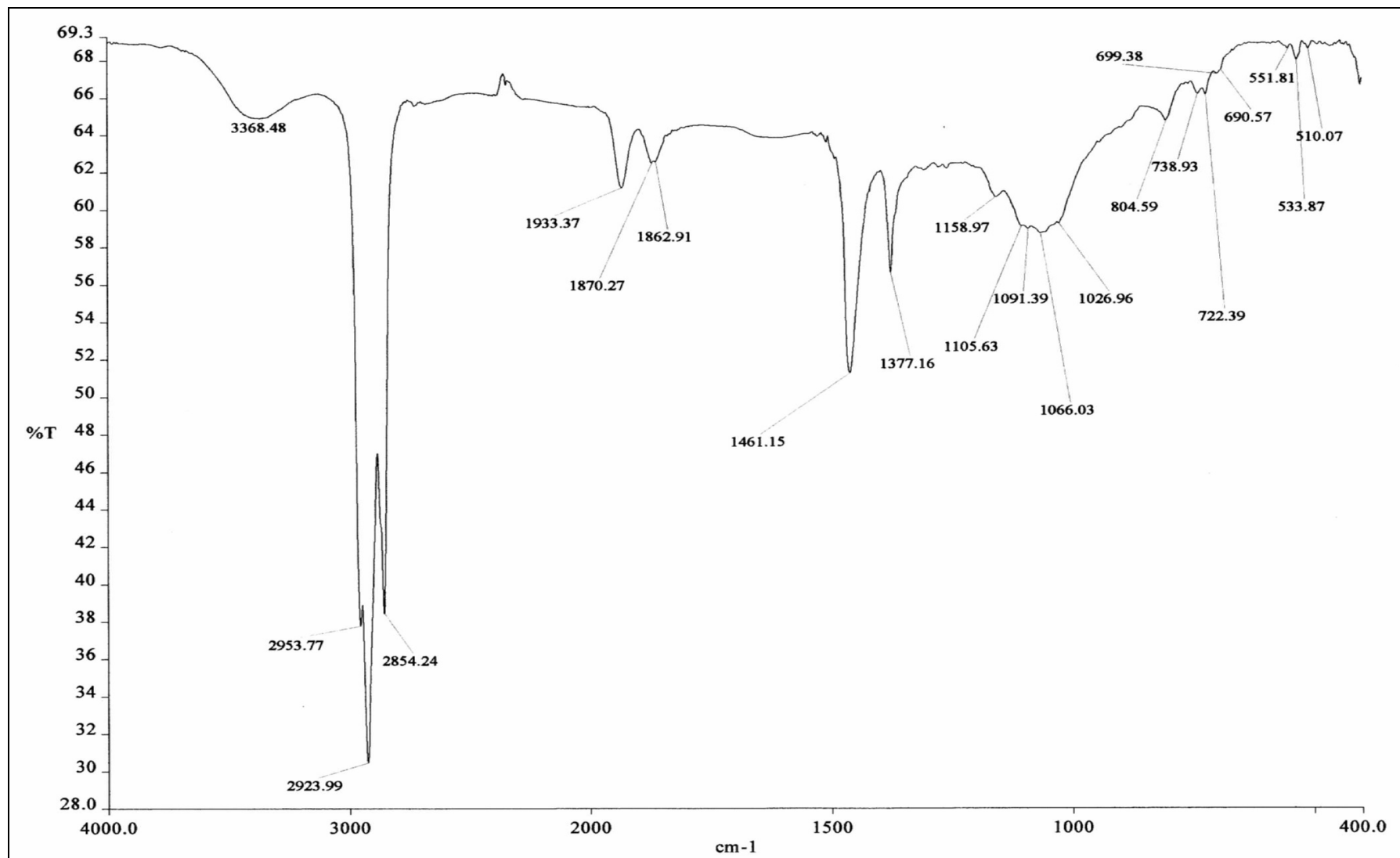




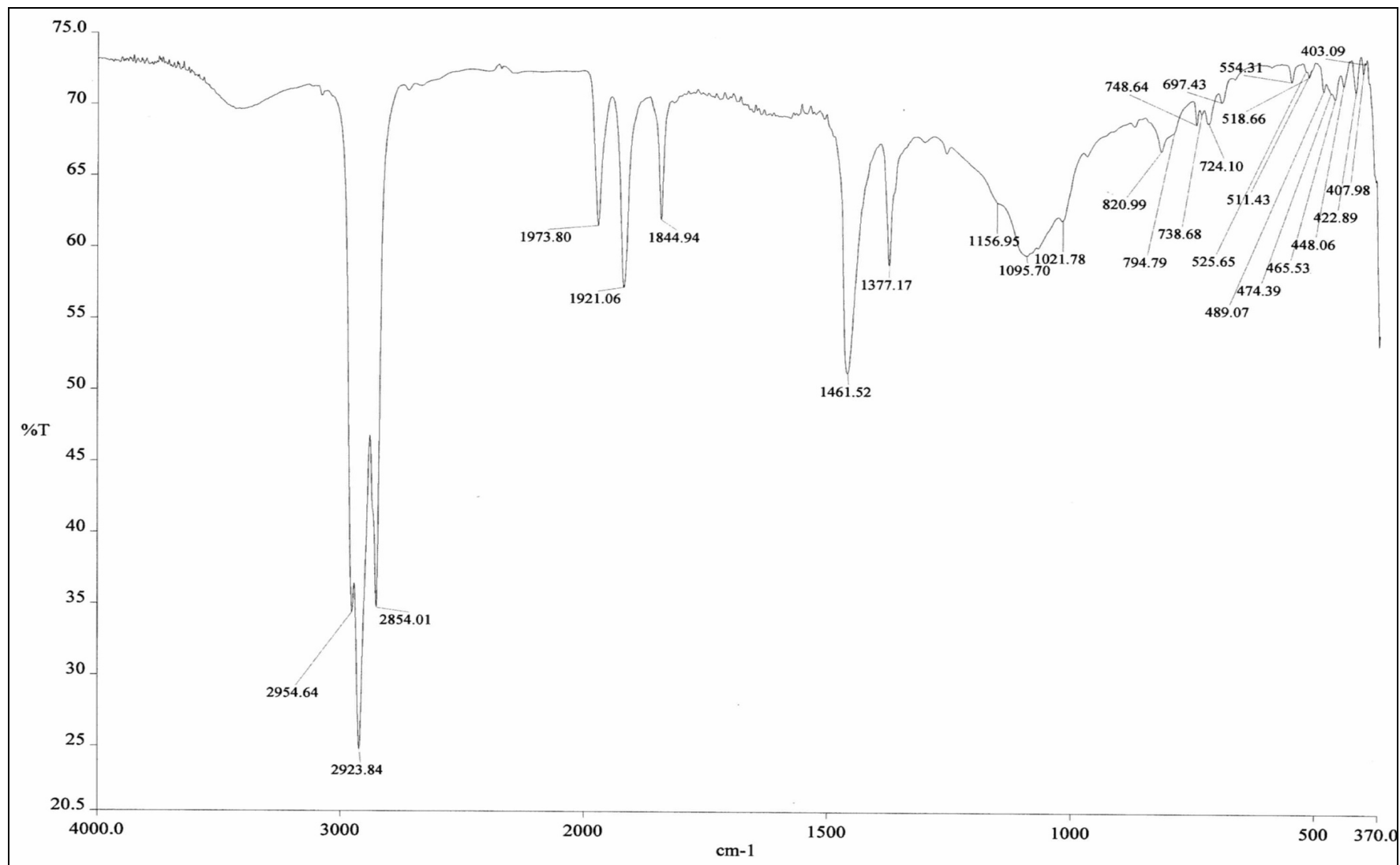
IR spectrum of  $[\text{Cp}_2\text{Mo}_2\{(\mu\text{-Se})_2(\text{PPh}(\text{Se}))\}\{(\mu\text{-Se})(\text{PPh})_3\}]$  (**25**)



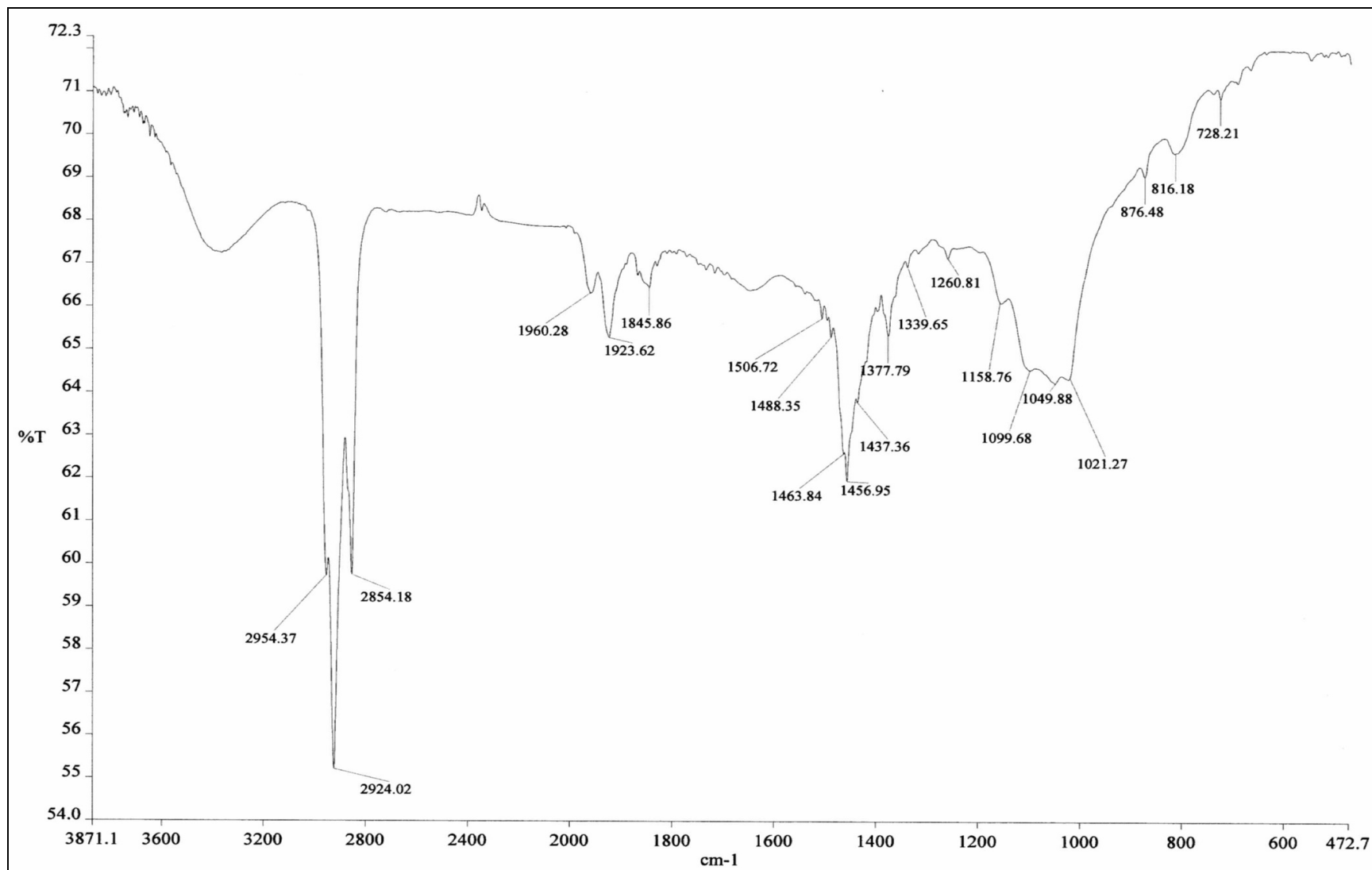
IR spectrum of  $\text{Cp}_4\text{Mo}_4(\text{CO})_3\text{Se}_4$  (**26**)



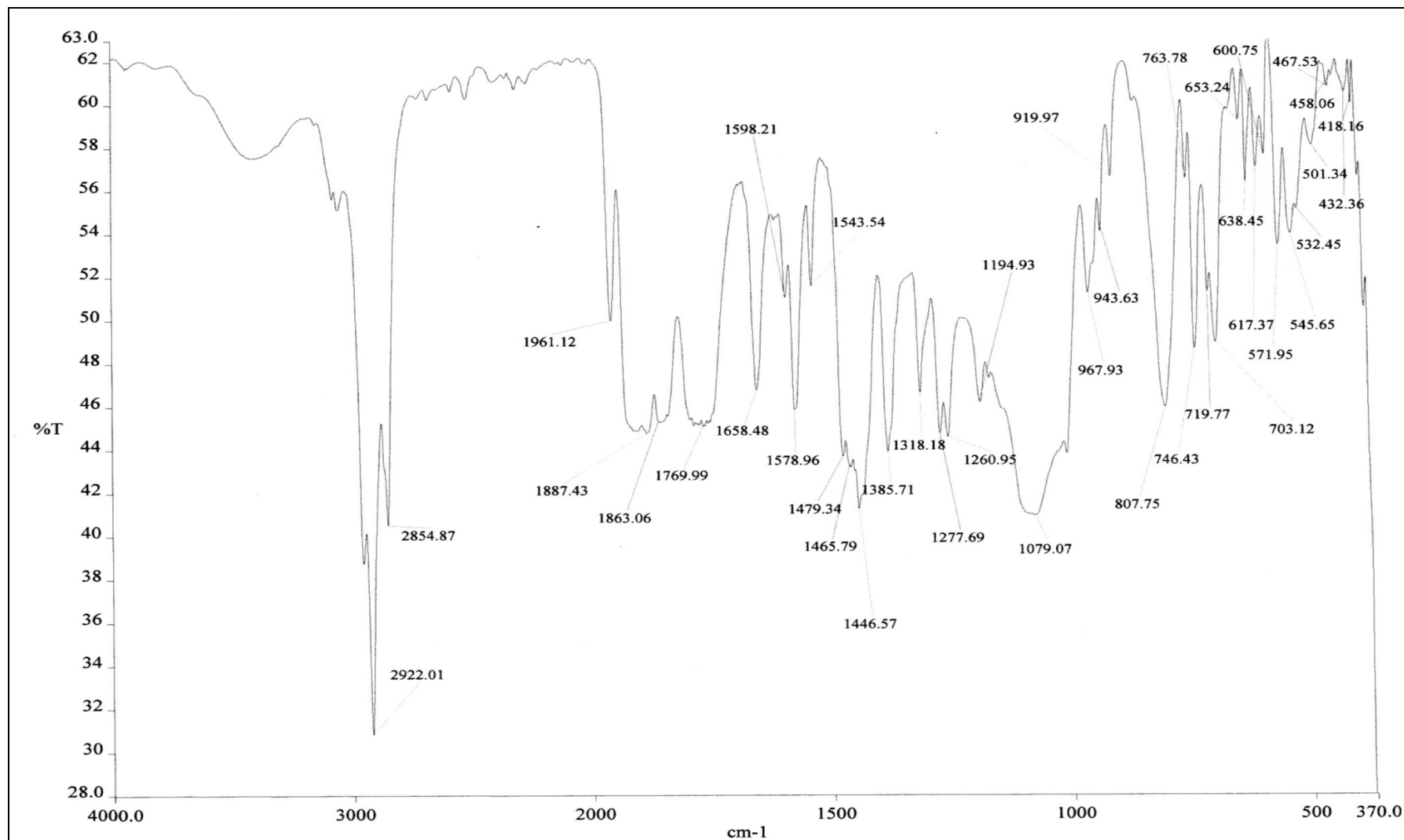
IR spectrum of  $\text{Cp}_3\text{Mo}_3(\text{CO})_4[\text{Se}_3(\text{PPh})_2]$  (**27a**)



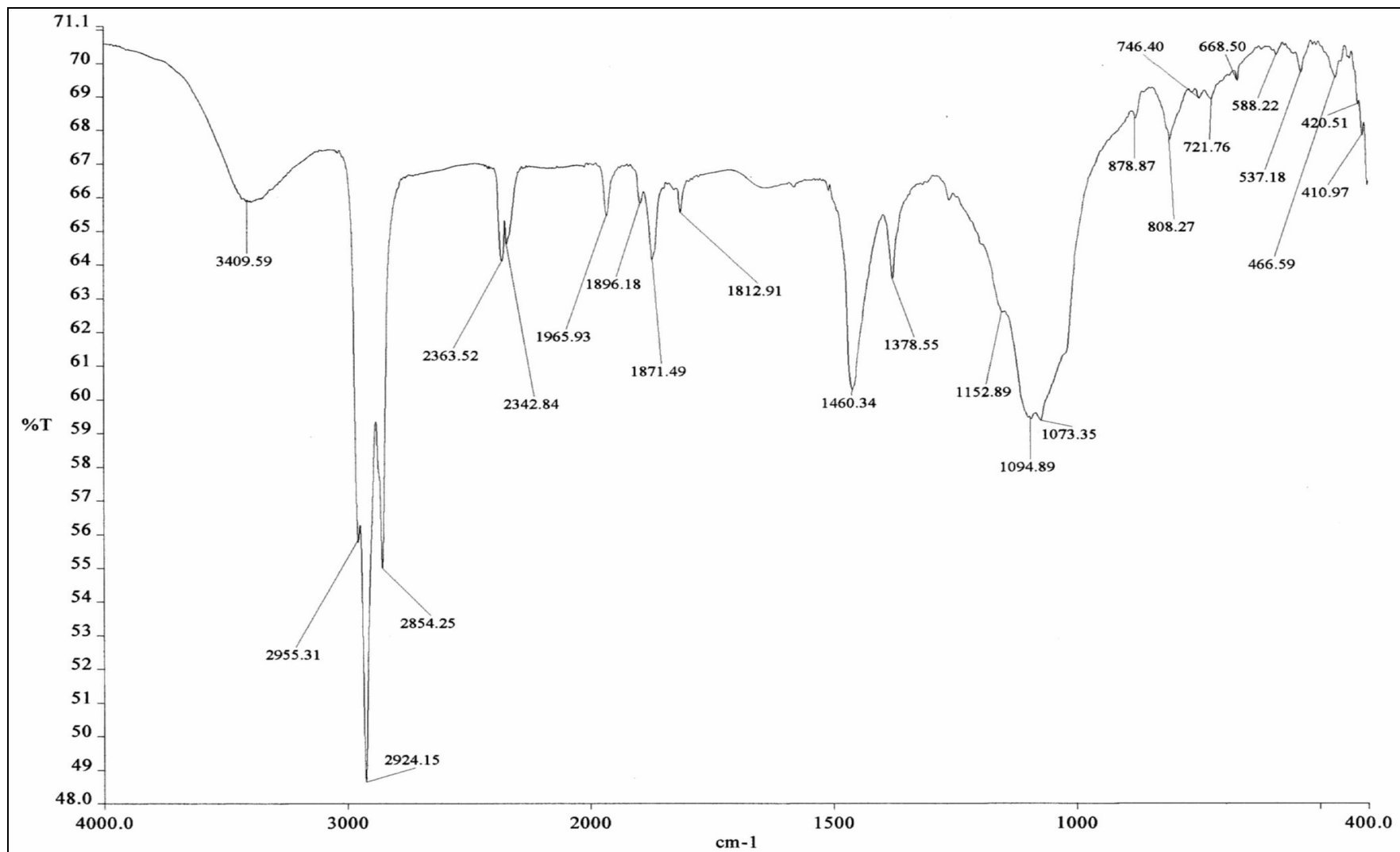
IR spectrum of  $\text{Cp}_3\text{Mo}_3(\text{CO})_4[\text{Se}_3(\text{PPh})_2]$  (**27b**)



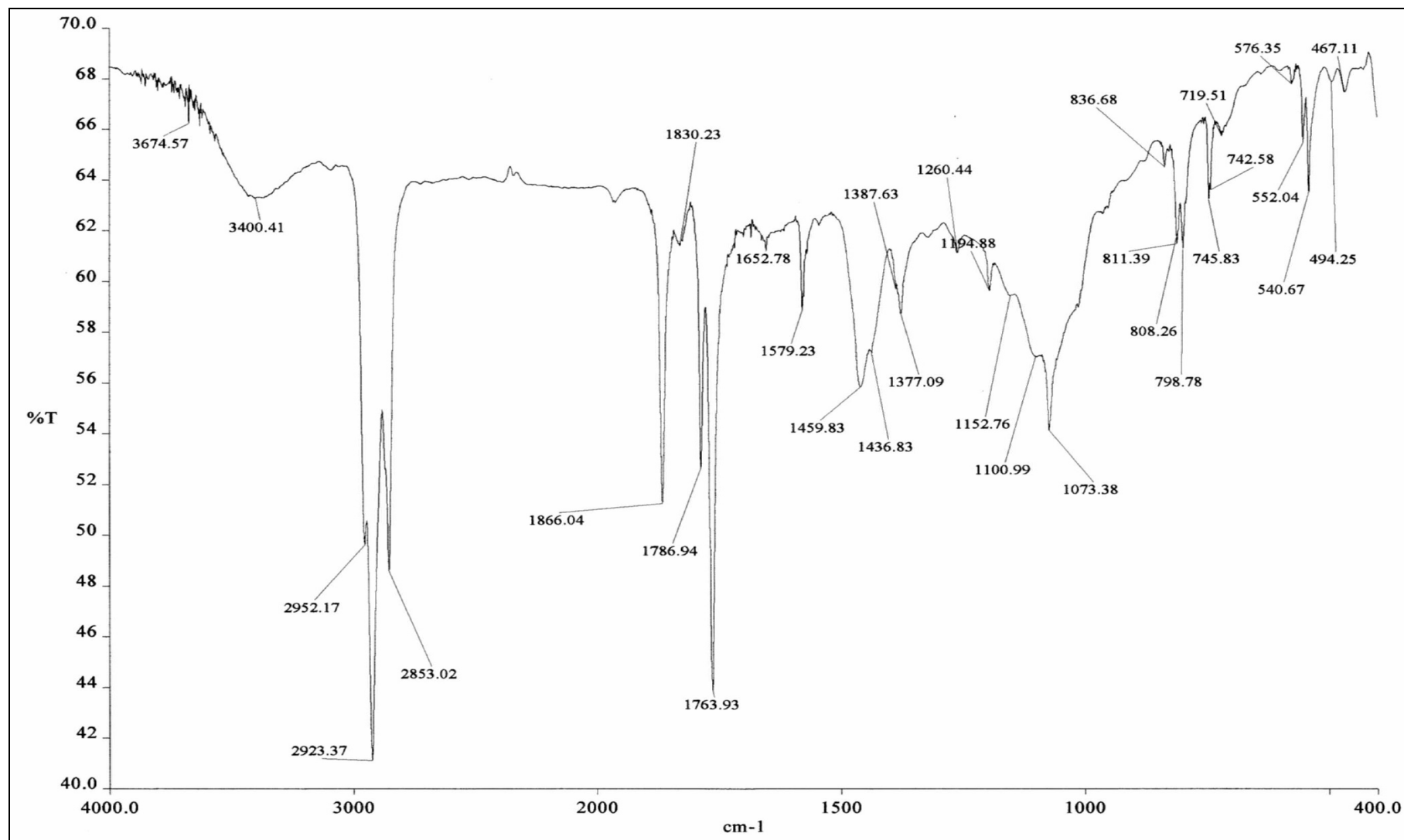
IR spectrum of  $[\text{CpCr}(\text{CO})_2\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}p)_3\}_2][\text{CpCr}(\text{CO})_3]$  (**28**)



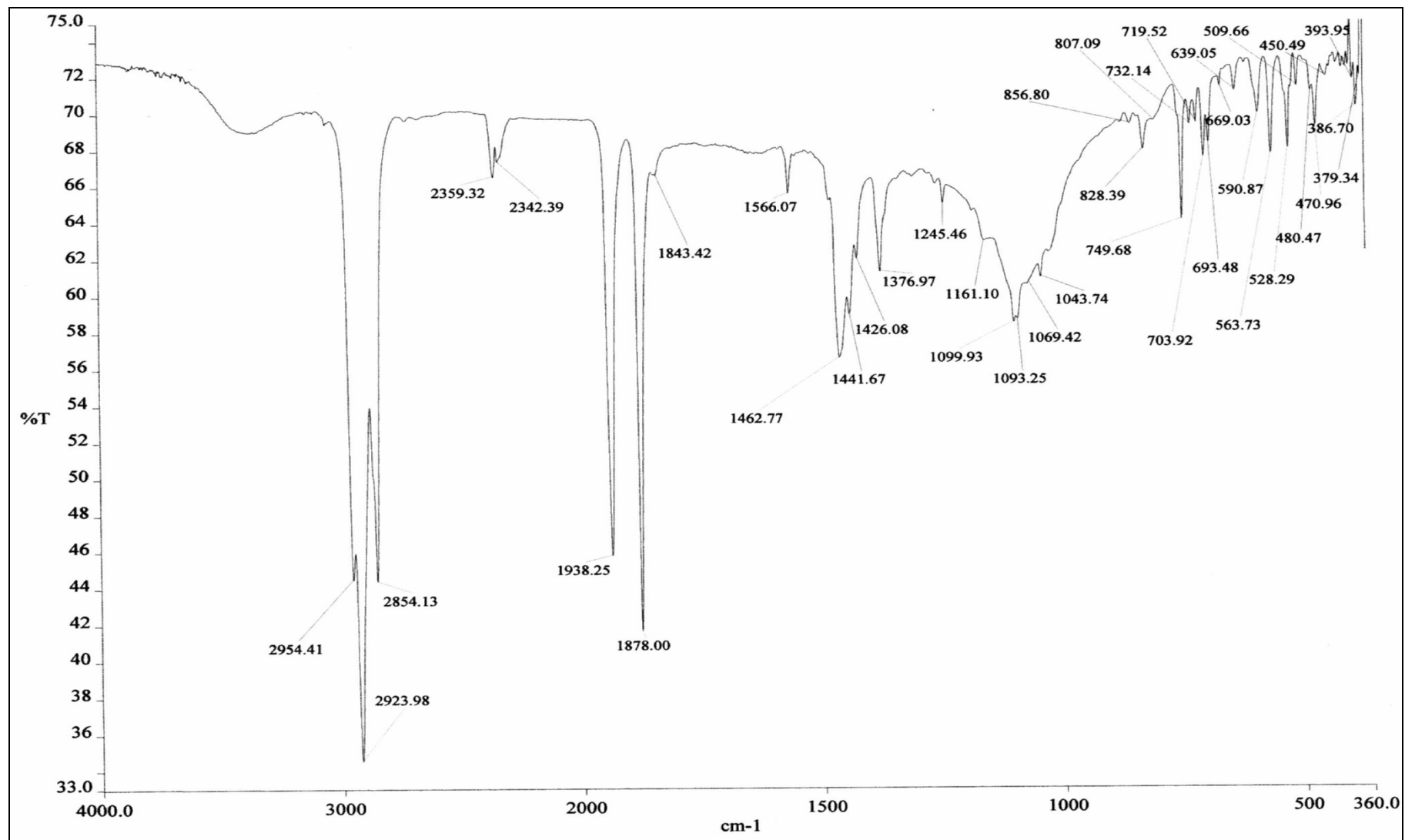
IR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})_5\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}p)_3\}_2]$  (**29**)



IR spectrum of  $\text{Cp}_2\text{Mo}_2(\text{CO})(\mu\text{-CO})_2\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}p)_3\}$  (**30**)

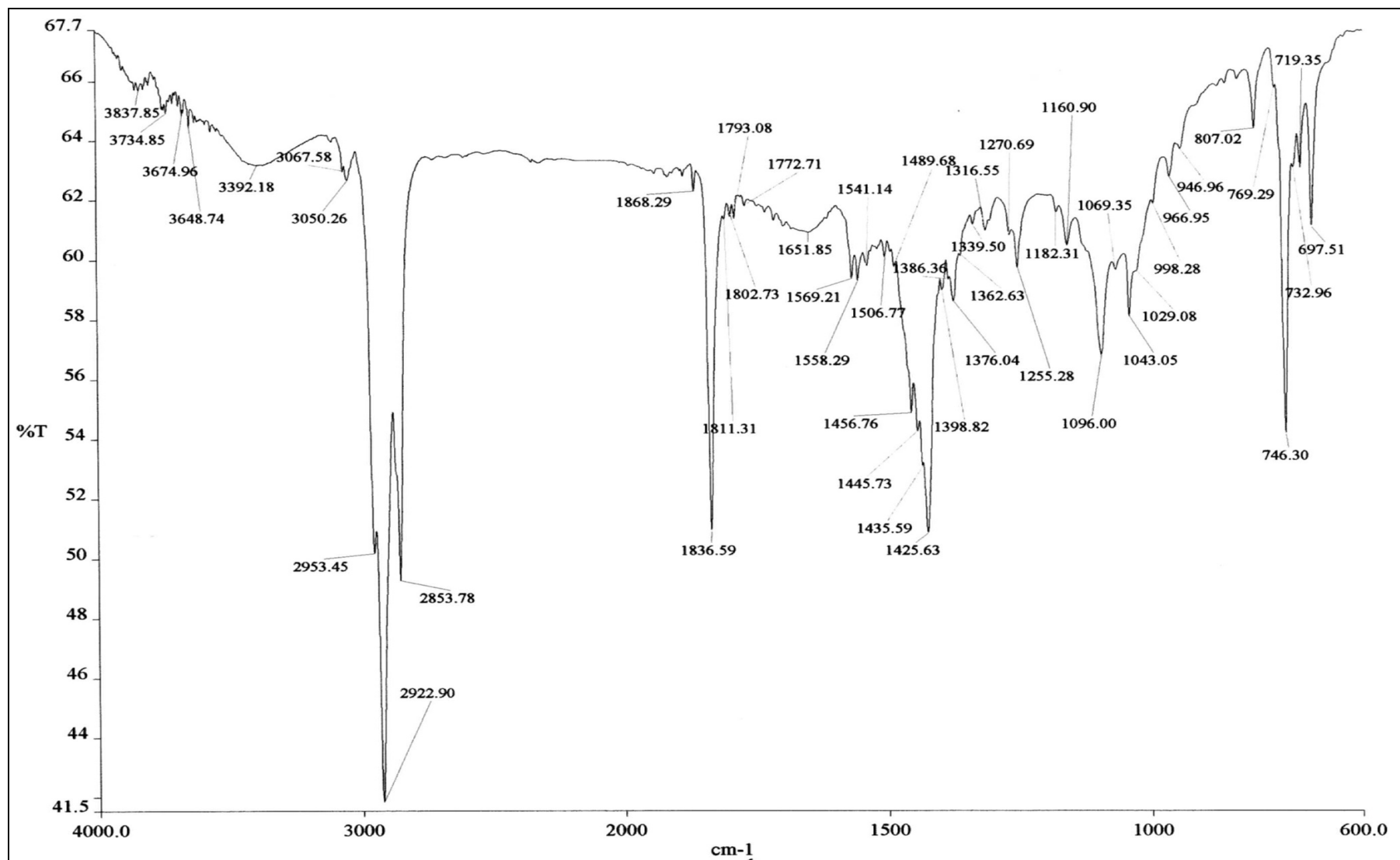


IR spectrum of  $\text{CpCr(CO)}_2(\mu\text{-C}_6\text{H}_4\text{S})\text{PPh}_2$  (**32**)

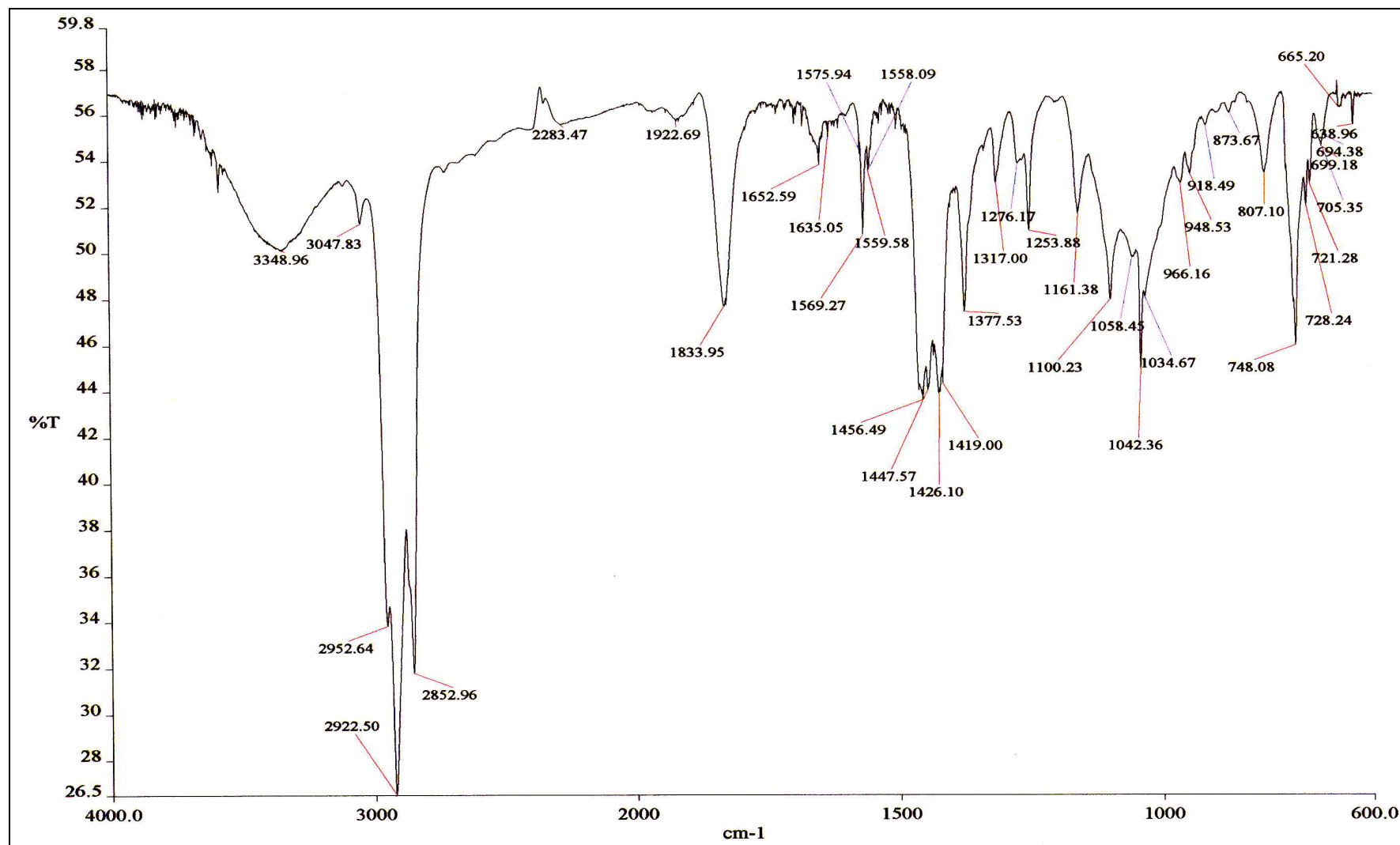




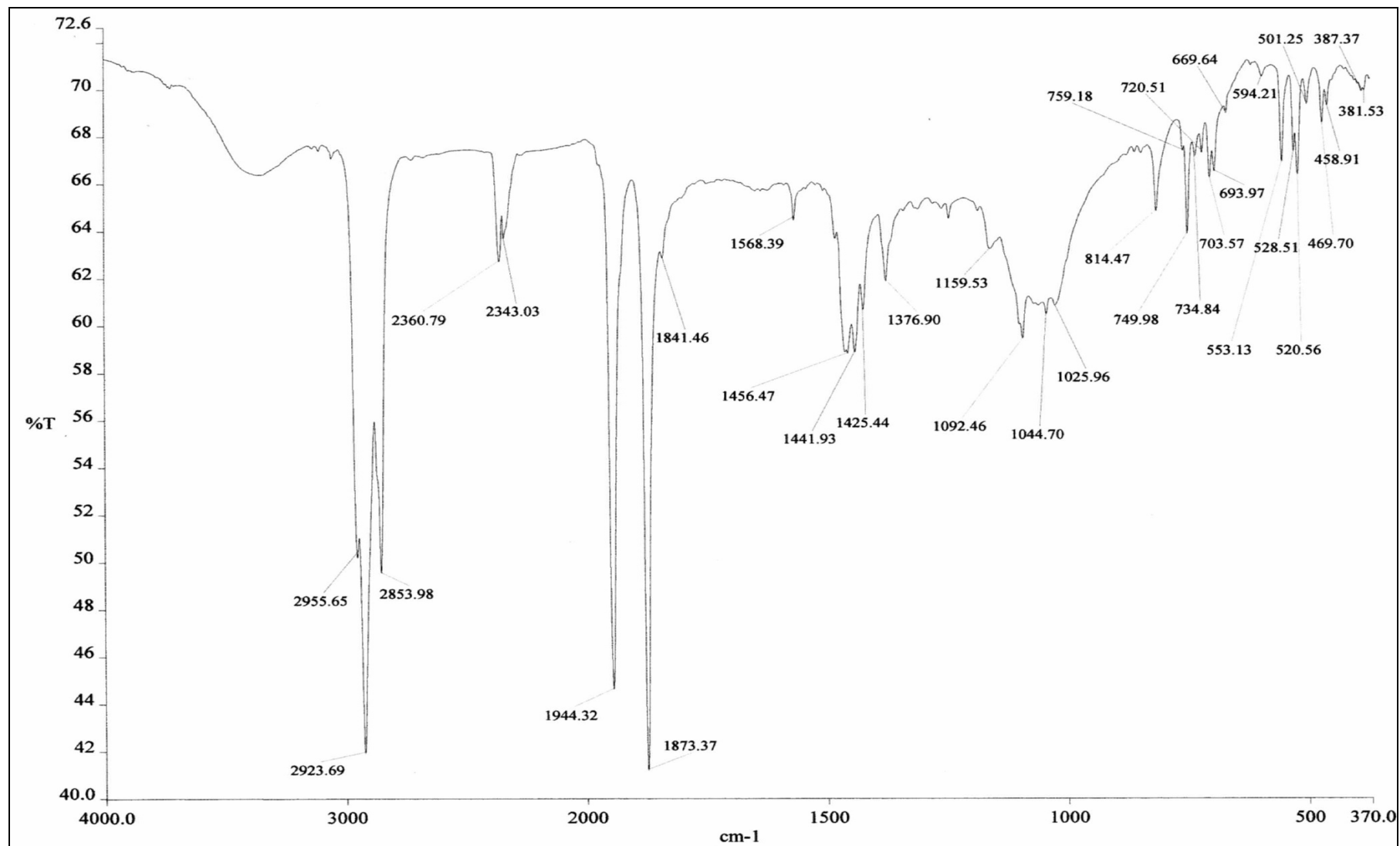
IR spectrum of  $[\text{Cp}_2\text{Cr}_2(\text{CO})\{\mu\text{-C}_6\text{H}_4\text{S}\}_2\text{PPh}\}]$  (**33**)



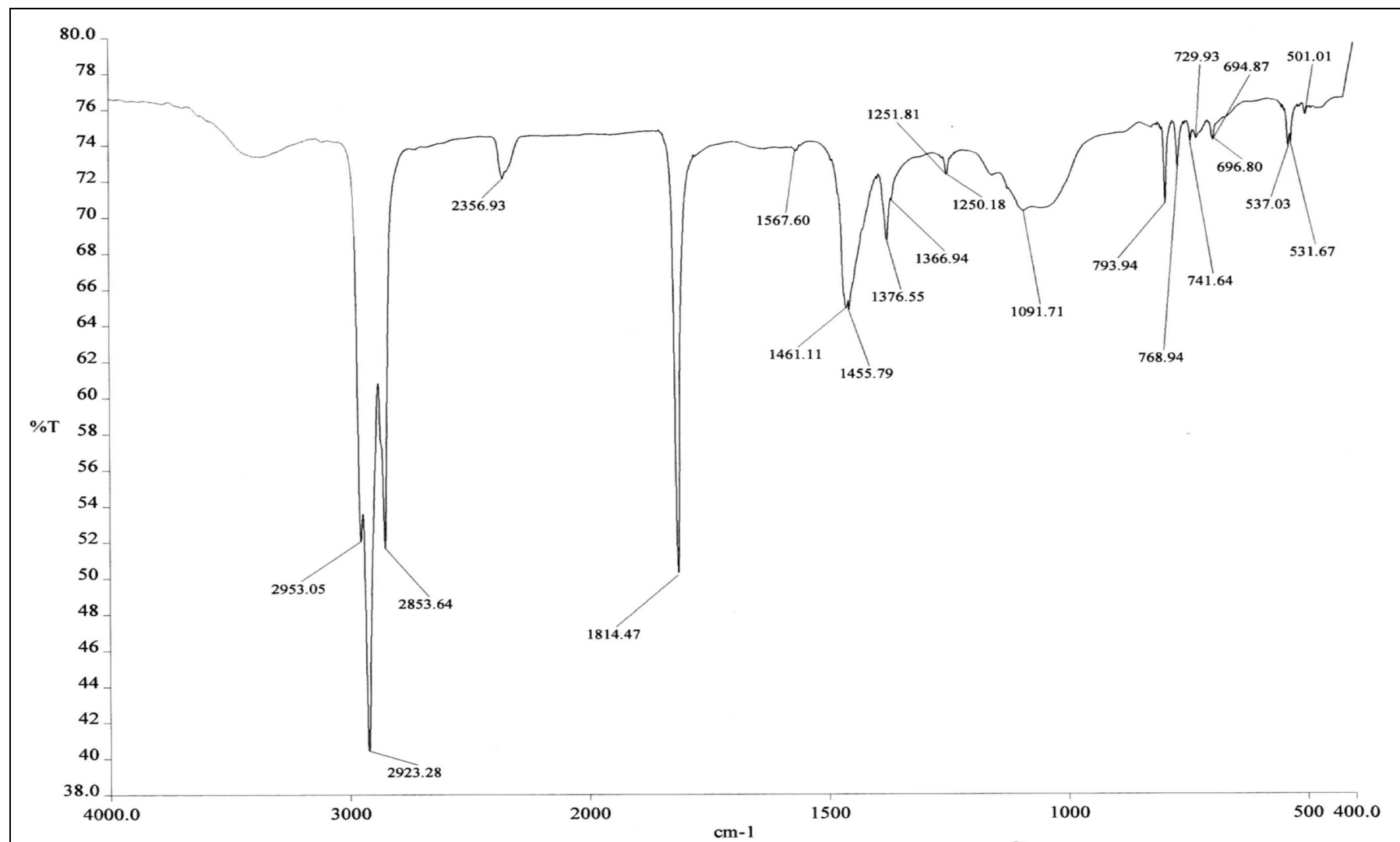
IR spectrum of  $[\text{Cp}_2\text{Cr}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SMe-}o)\text{P}\}]$  (**35**)



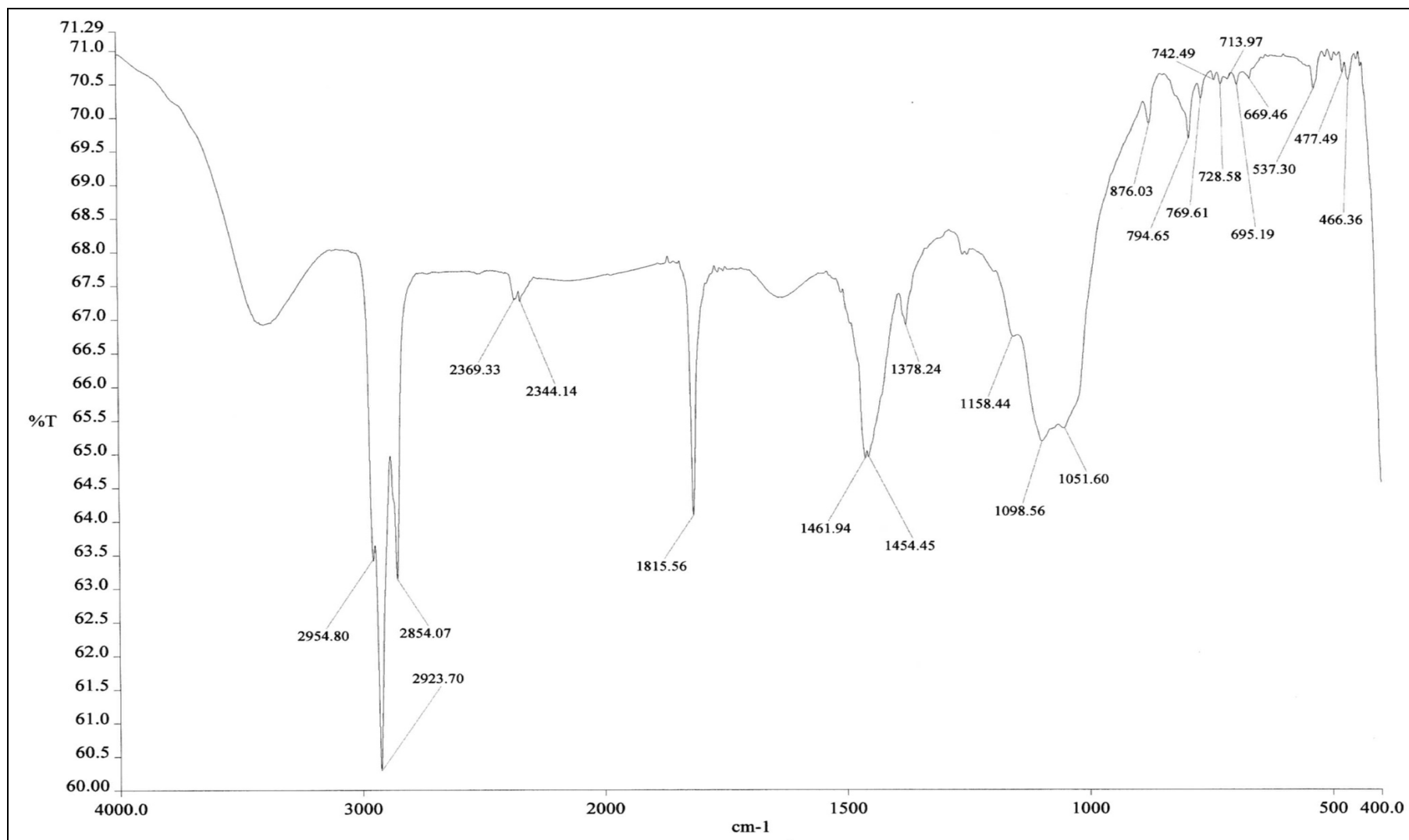
IR spectrum of  $\text{CpMo(CO)}_2(\mu\text{-C}_6\text{H}_4\text{S})\text{PPh}_2$  (**36**) in nujol



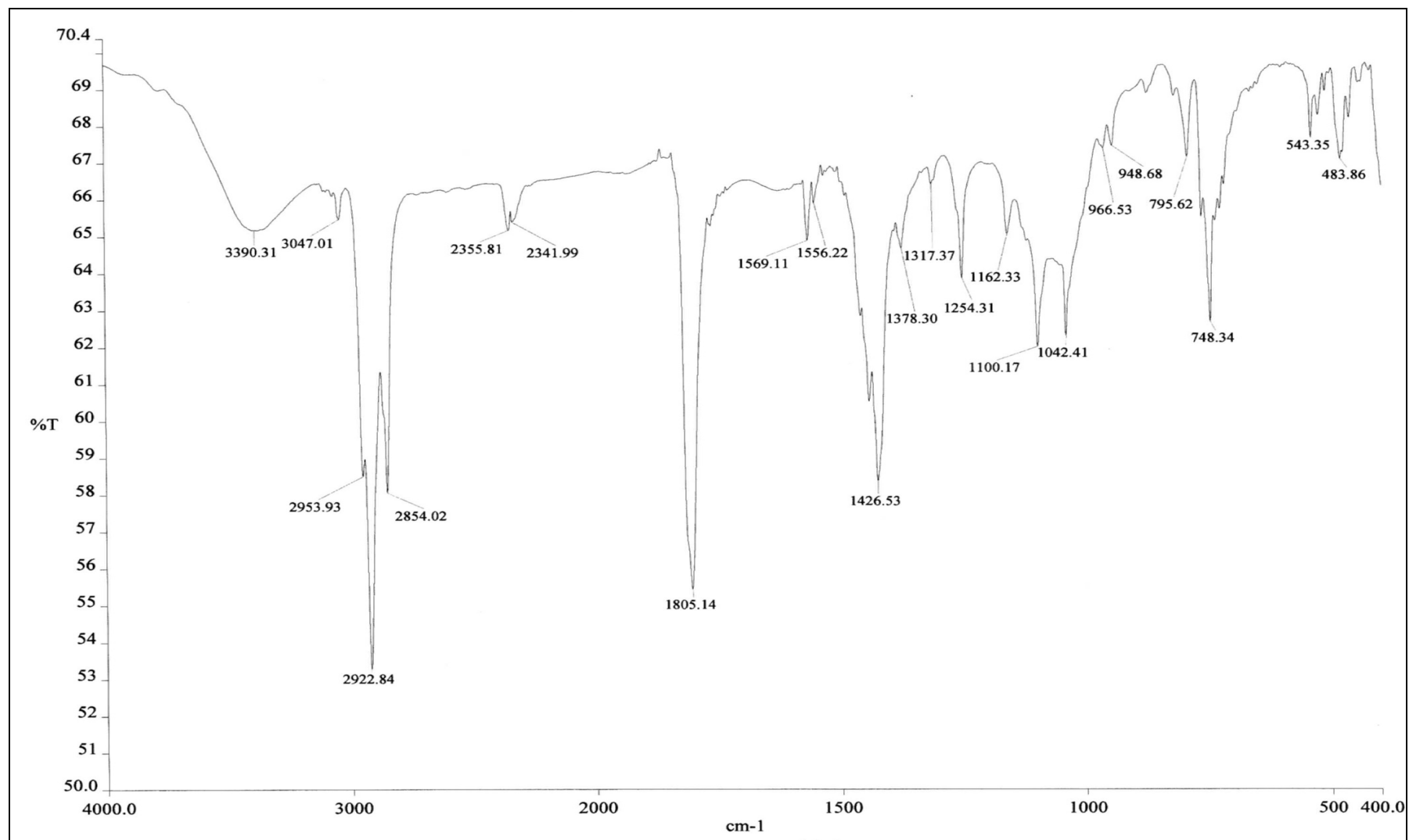
IR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})\{\mu\text{-C}_6\text{H}_4\text{S}\}_2\text{PPh}\}$  (**38**) in nujol



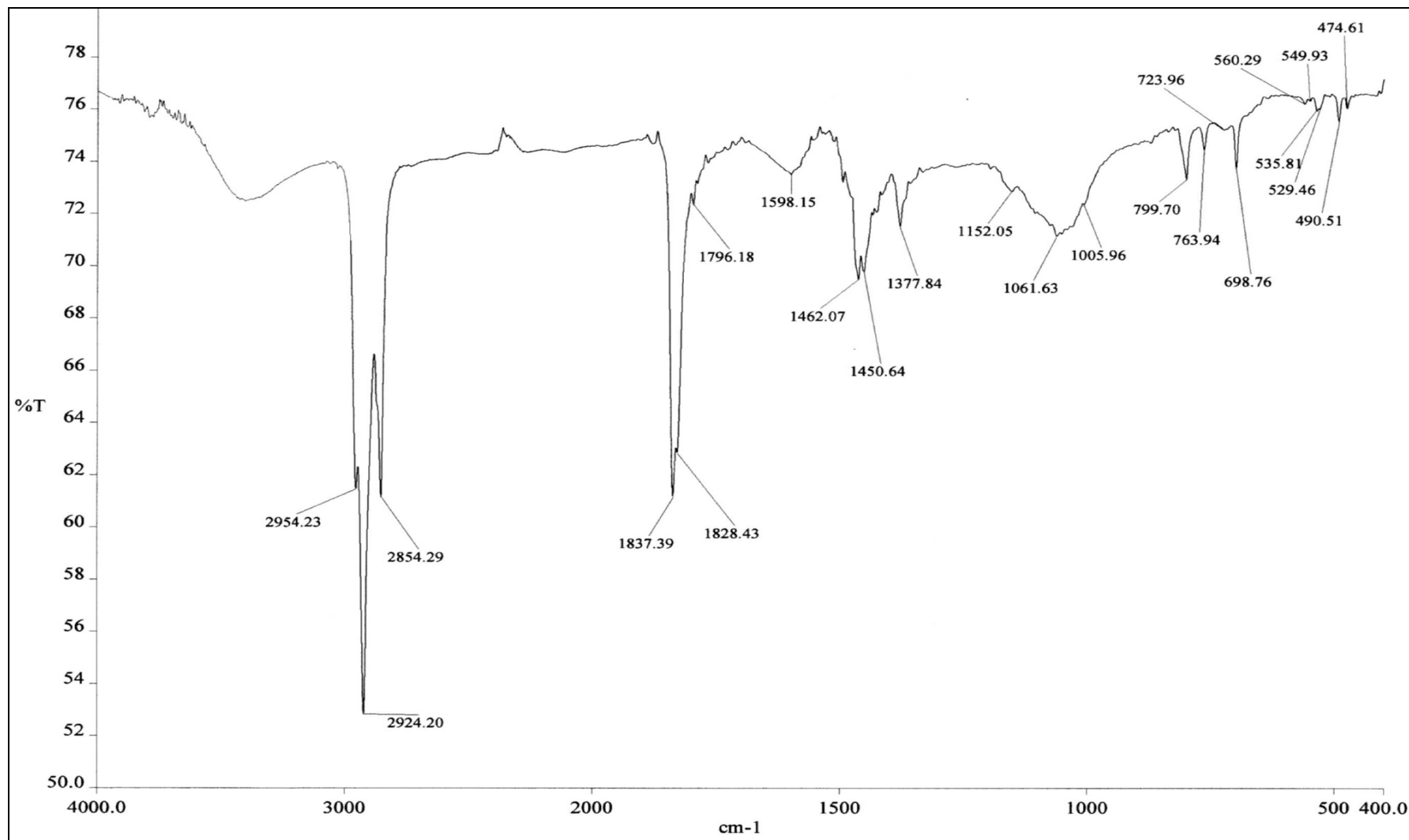
IR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SCH}_2)\text{P}\}]$  (**40**)



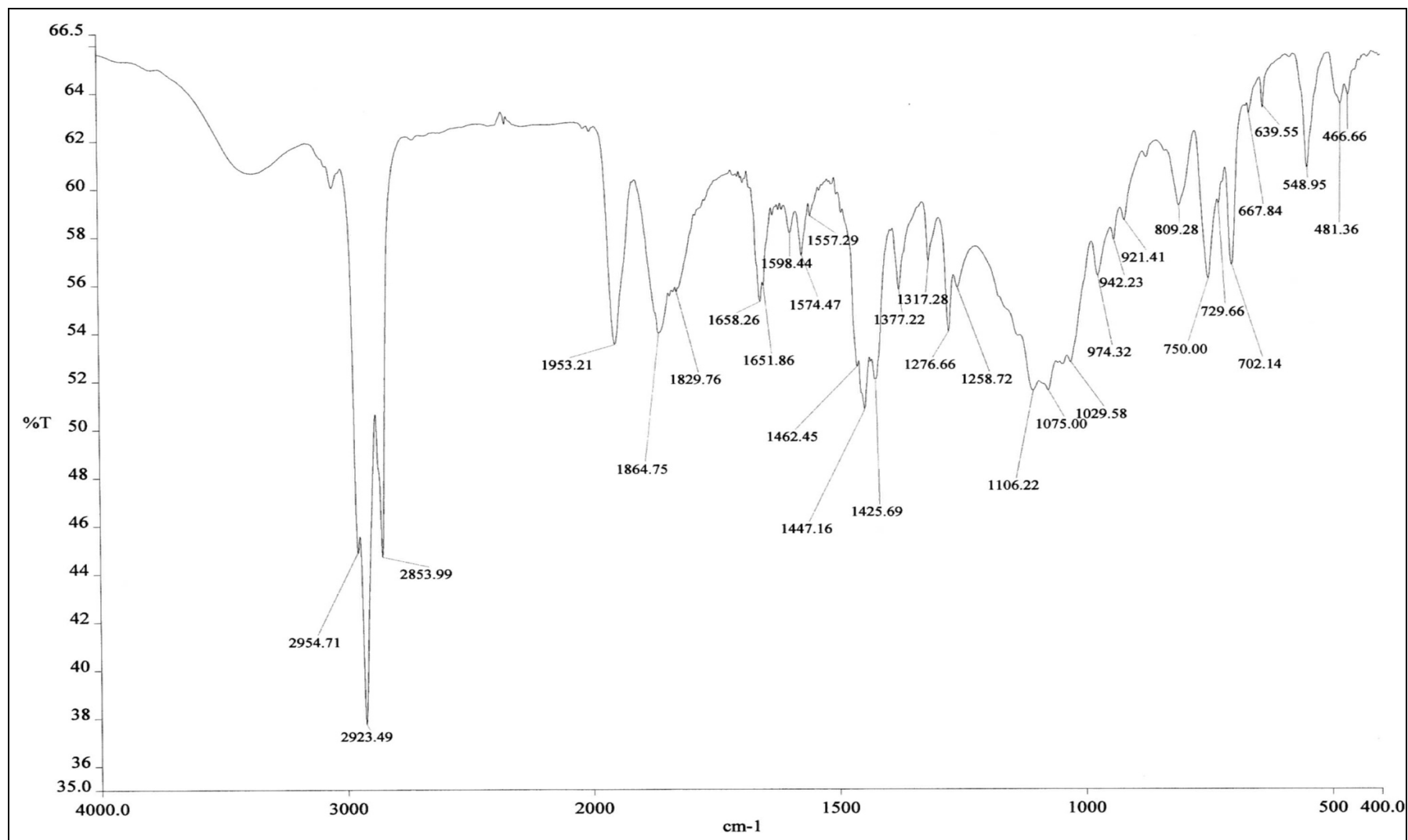
IR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SMe-}o)\text{P}\}]$  (**41**)



IR spectrum of  $\text{Mo(CO)}_3\{\text{P(C}_6\text{H}_4\text{SMe-}o\text{)}_3\}$  (**42**)

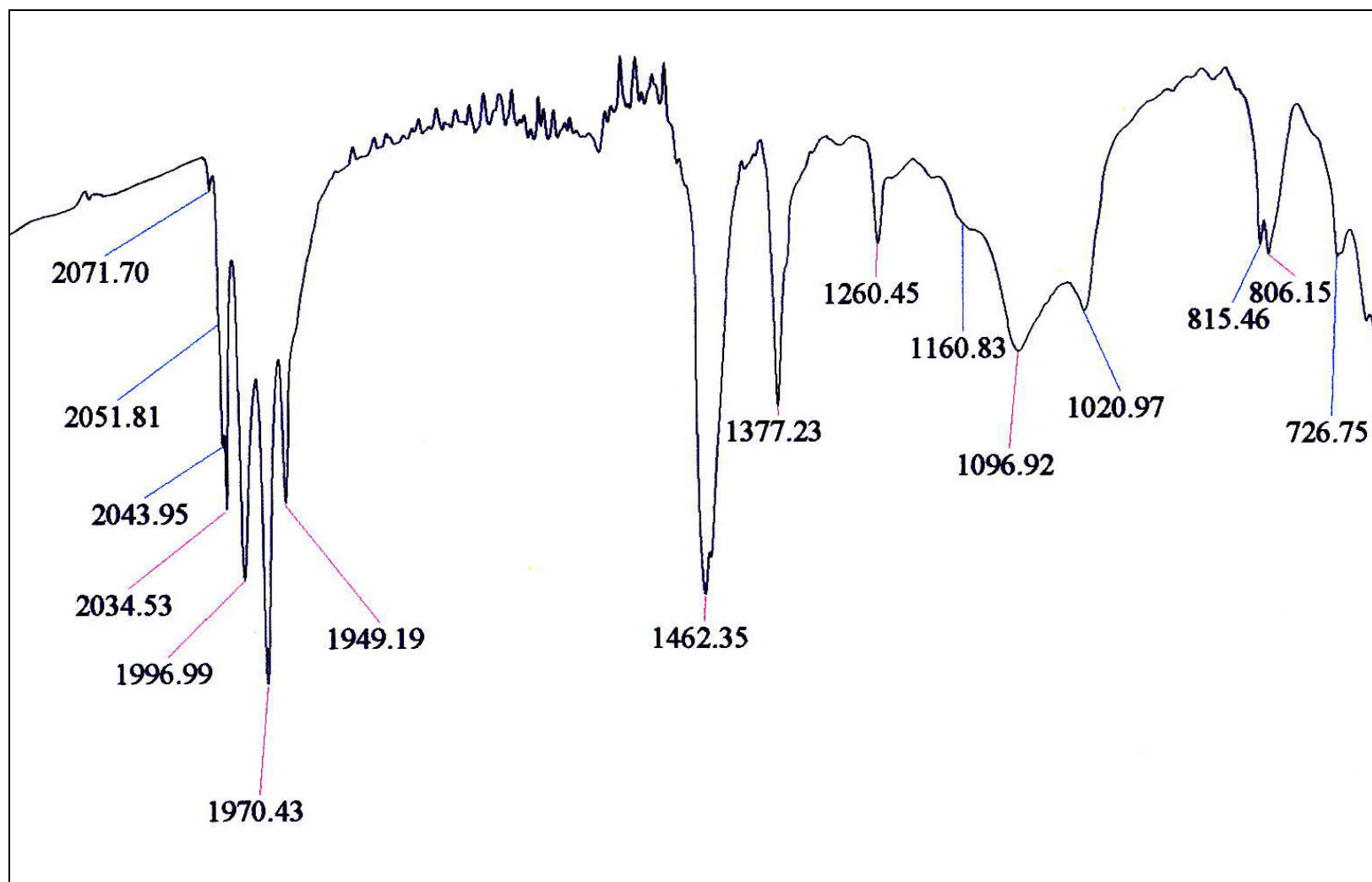


IR spectrum of  $\text{CpMo}_2(\text{CO})_3(\mu\text{-S})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SMe-}o)\text{P}\}$  (**43**)

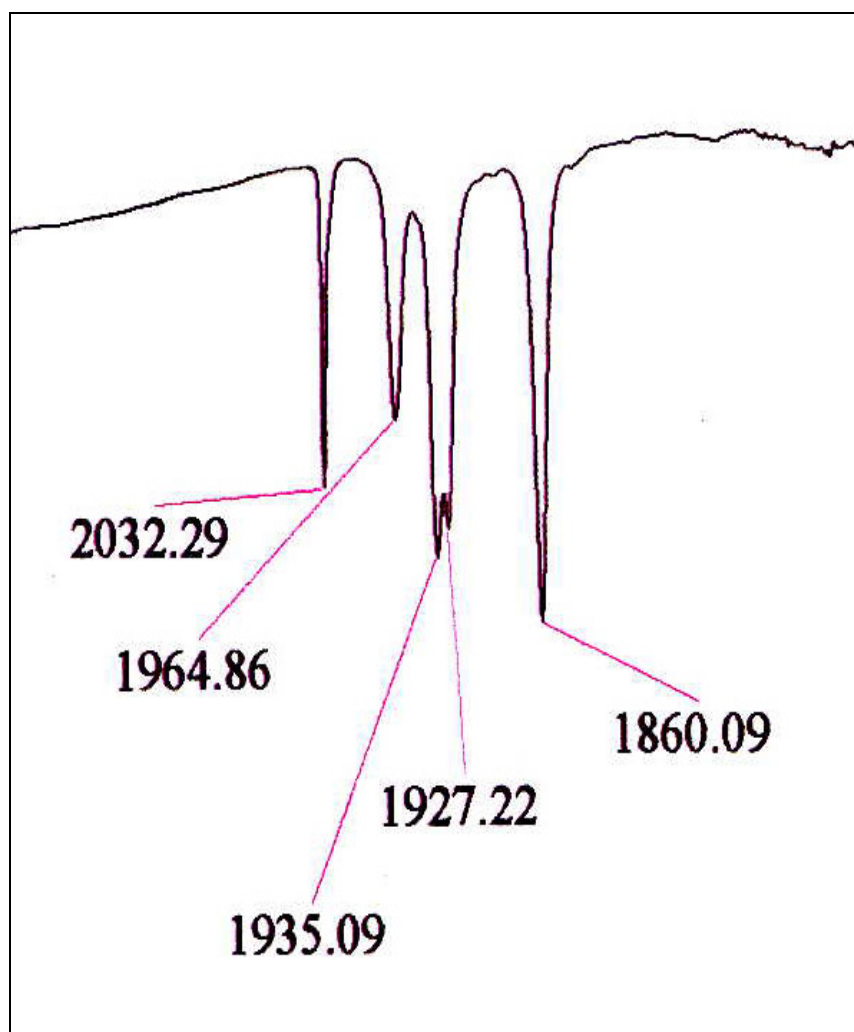




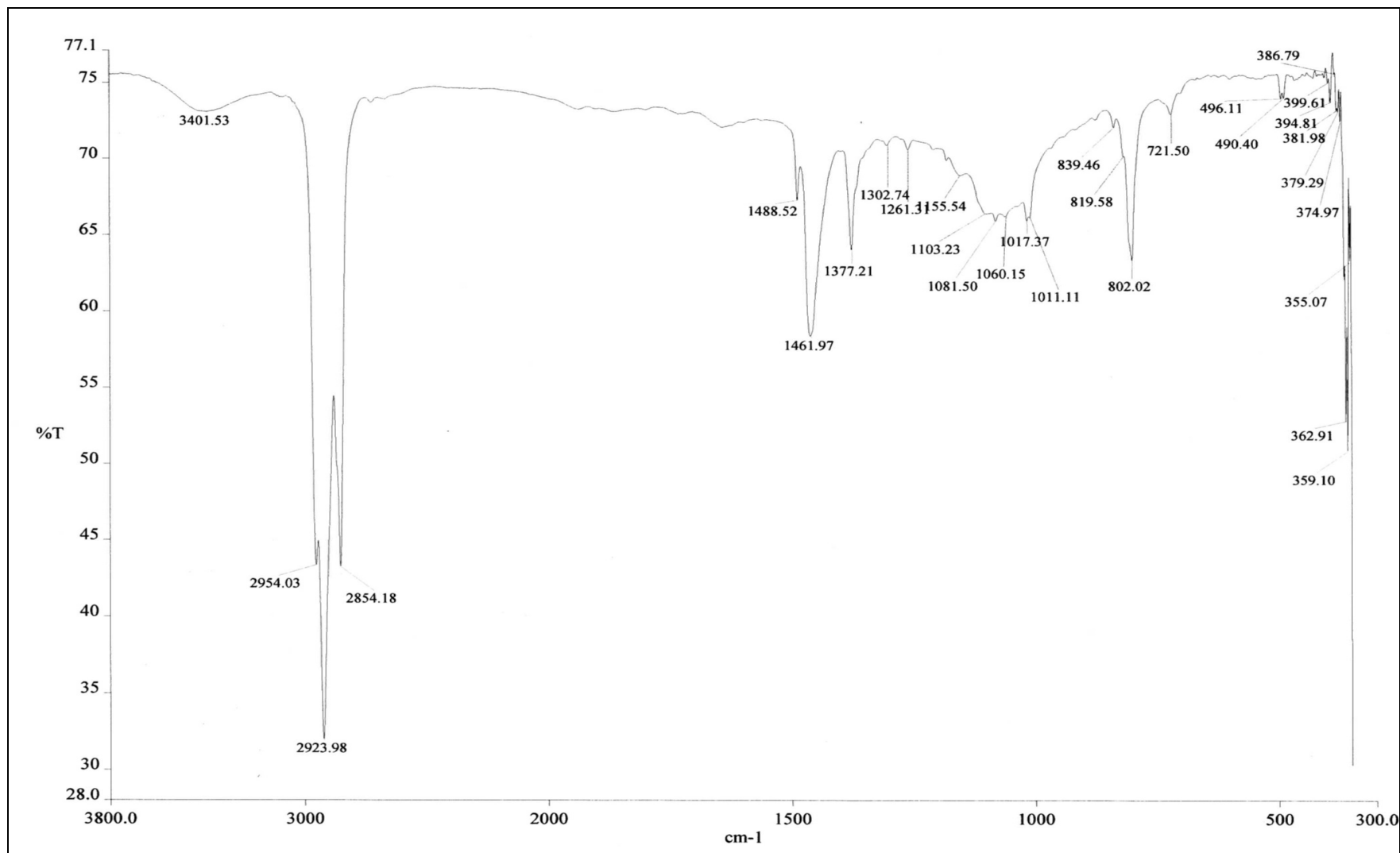
IR spectrum of  $[\text{CpMo}]_2\text{S}_4[\text{Fe}(\text{CO})_3]_2$  (**45**)



CO stretching frequencies of  $[\text{CpMo}(\text{SBz})_2\text{S}_2[\text{Fe}(\text{CO})_2]$  (**47**) in nujol

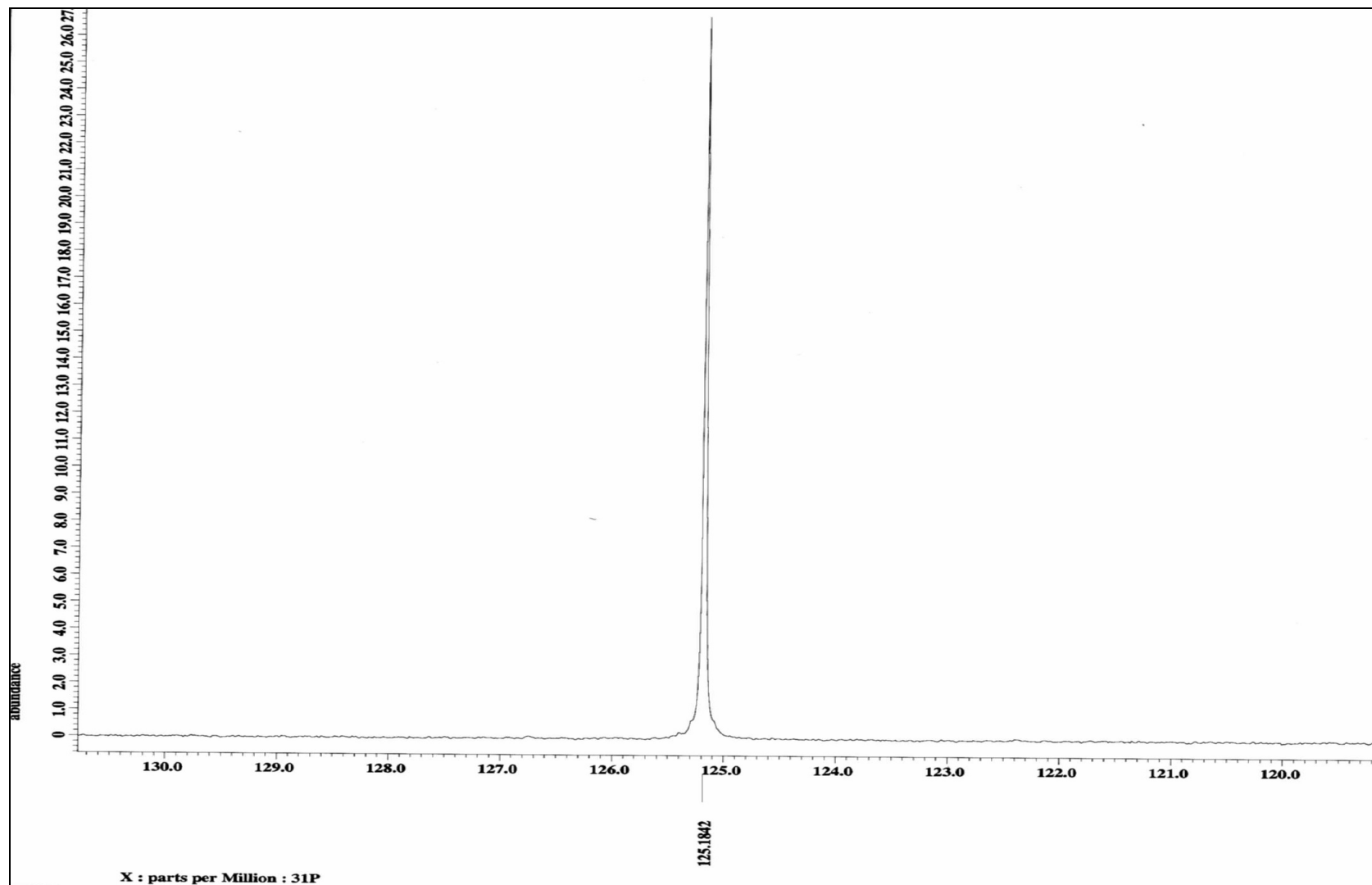


IR spectrum of  $[\text{CpCr}(\mu\text{-SC}_6\text{H}_4\text{Me})_2\text{S}]$  (**48**) in nujol

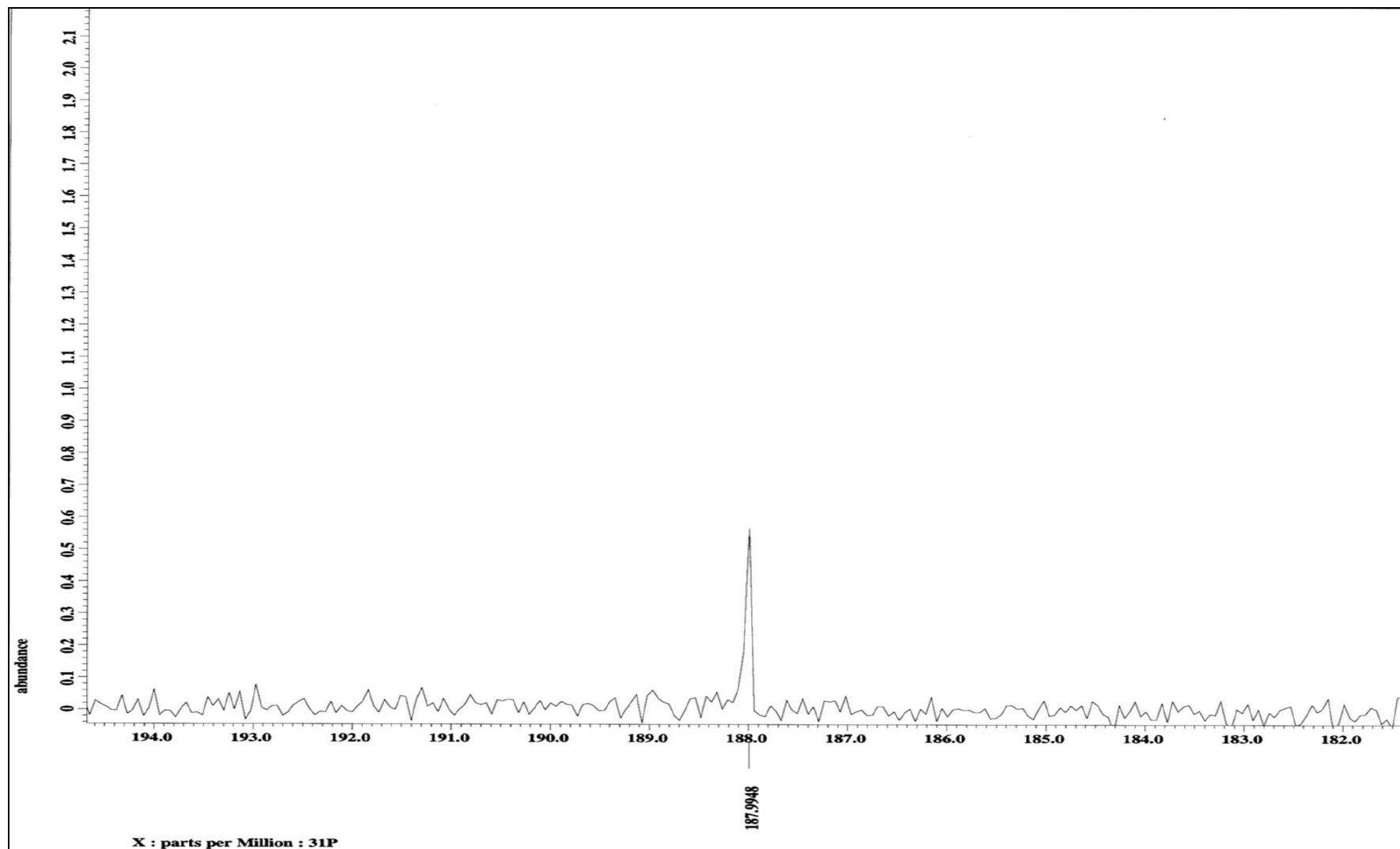


## APPENDIX II

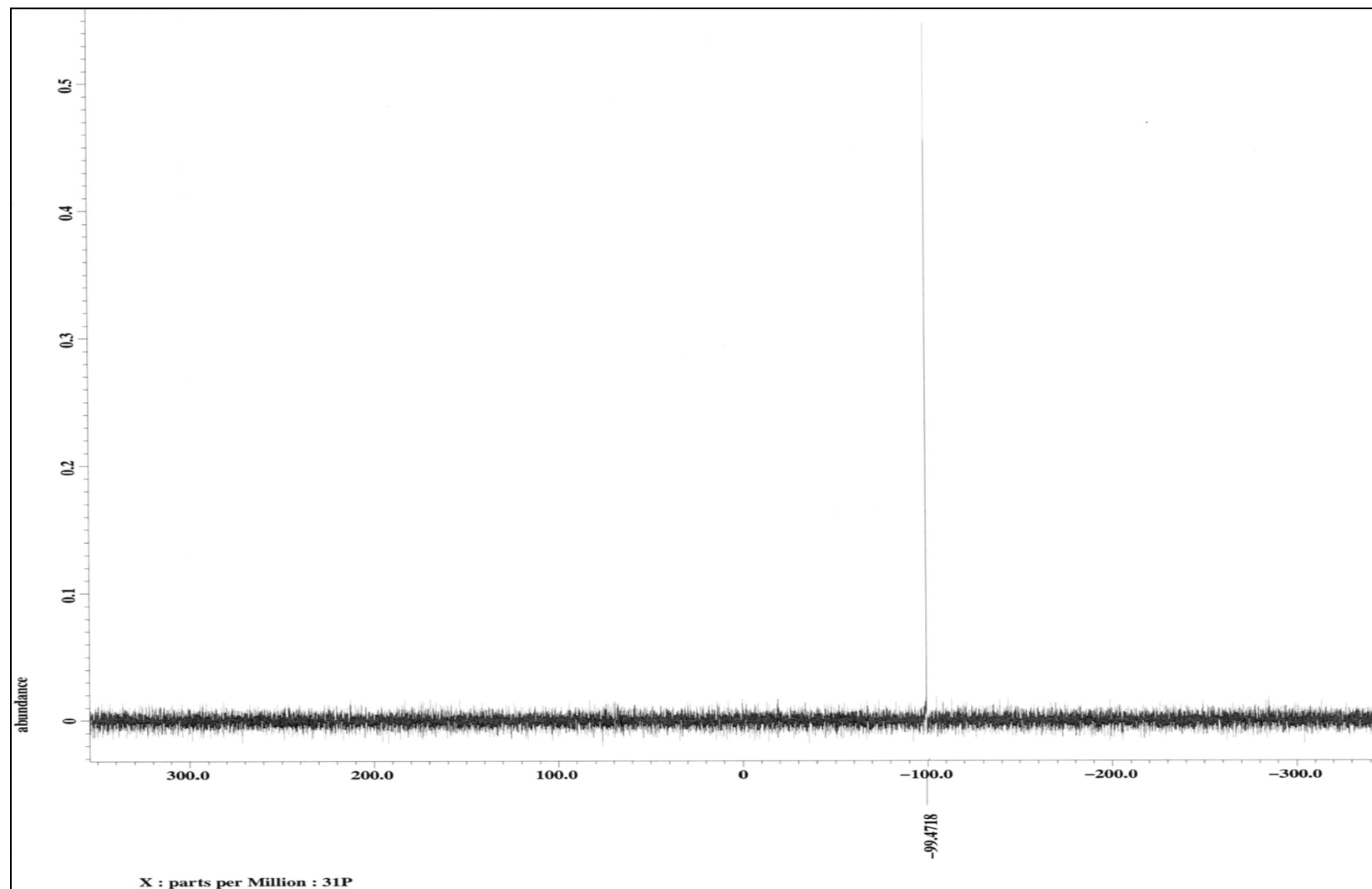
$^{31}\text{P}$  NMR spectrum of  $[\text{CpMo}(\text{CO})_2(\text{S}_2\text{P}(\text{SC}_6\text{H}_4\text{Me})_2)]$  (**14**)



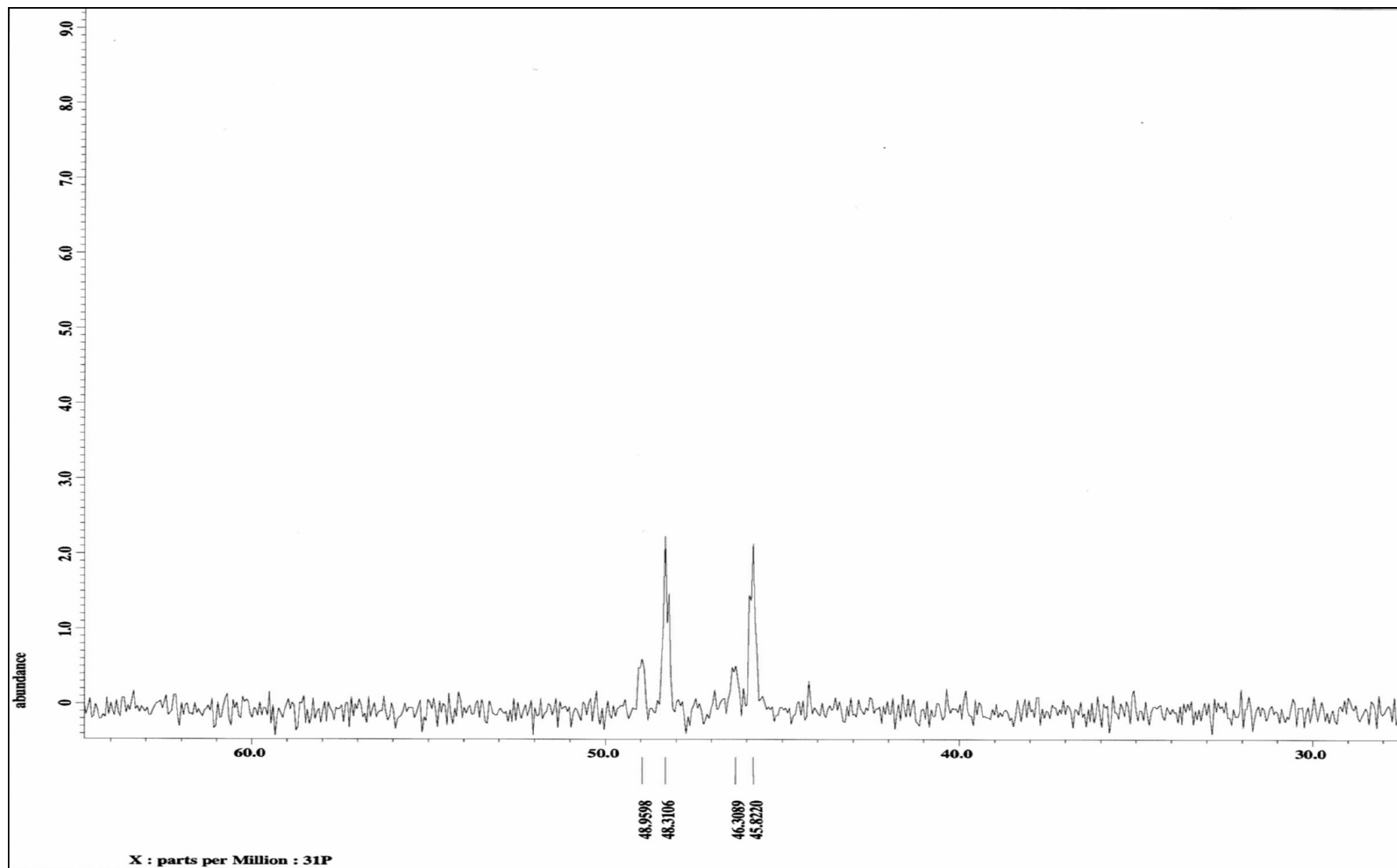
$^{31}\text{P}$  NMR spectrum of  $\text{Cp}_2\text{Mo}_2(\text{CO})_5(\text{S}_2\text{P}(\text{SC}_6\text{H}_4\text{Me}))$  (**15**)



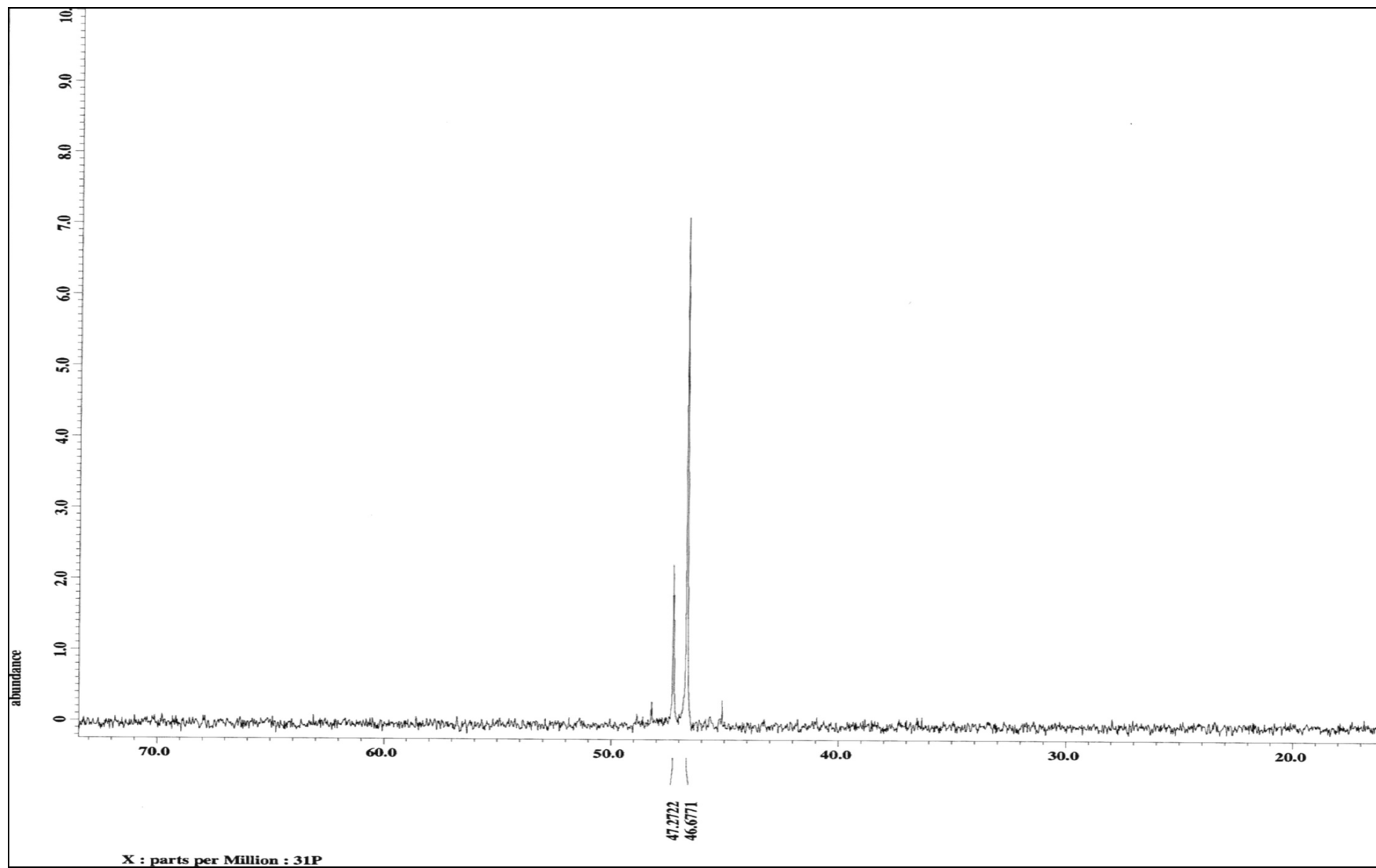
$^{31}\text{P}$  NMR spectrum of  $\text{Cp}_2\text{Mo}_2(\text{CO})_2(\mu\text{-PS})(\mu\text{-SC}_6\text{H}_4\text{Me})$  (**18**)



$^{31}\text{P}$  NMR couple spectrum of  $\text{CpCr}(\text{CO})_2\{\text{SeP}(\text{H})\text{Ph}\}$  (**23**)

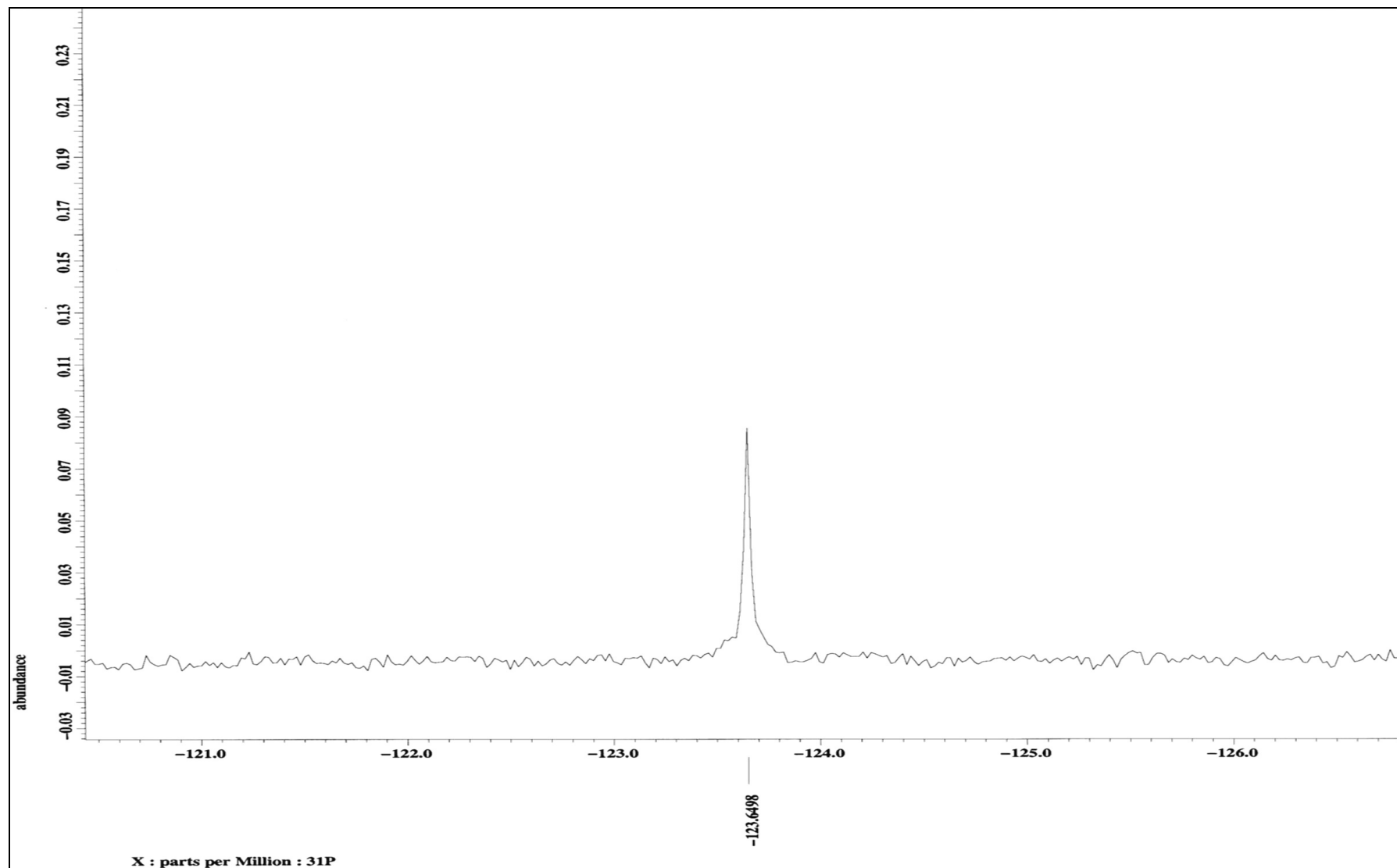


$^{31}\text{P}$  NMR decouple spectrum of  $\text{CpCr}(\text{CO})_2\{\text{SeP}(\text{H})\text{Ph}\}$  (**23**)

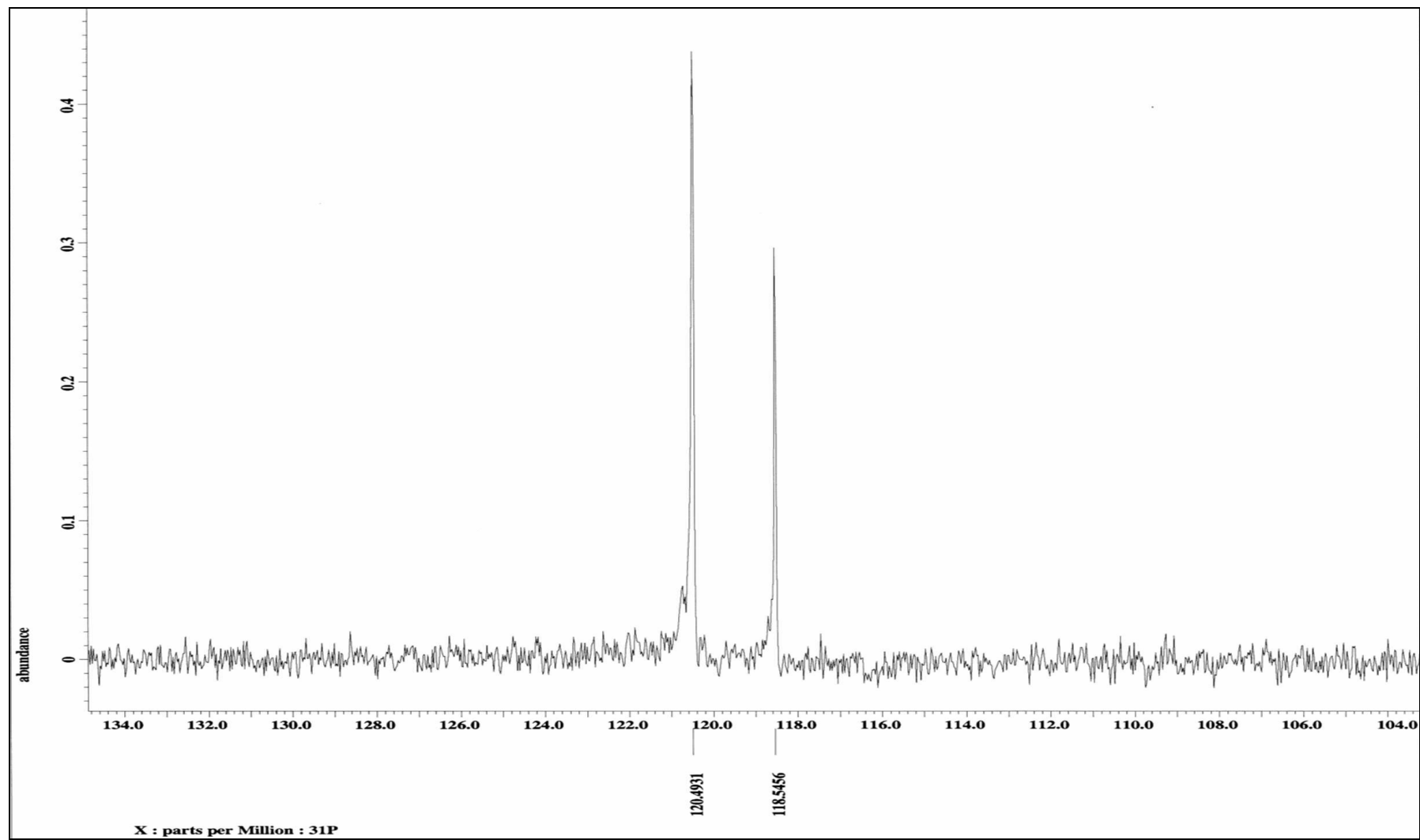




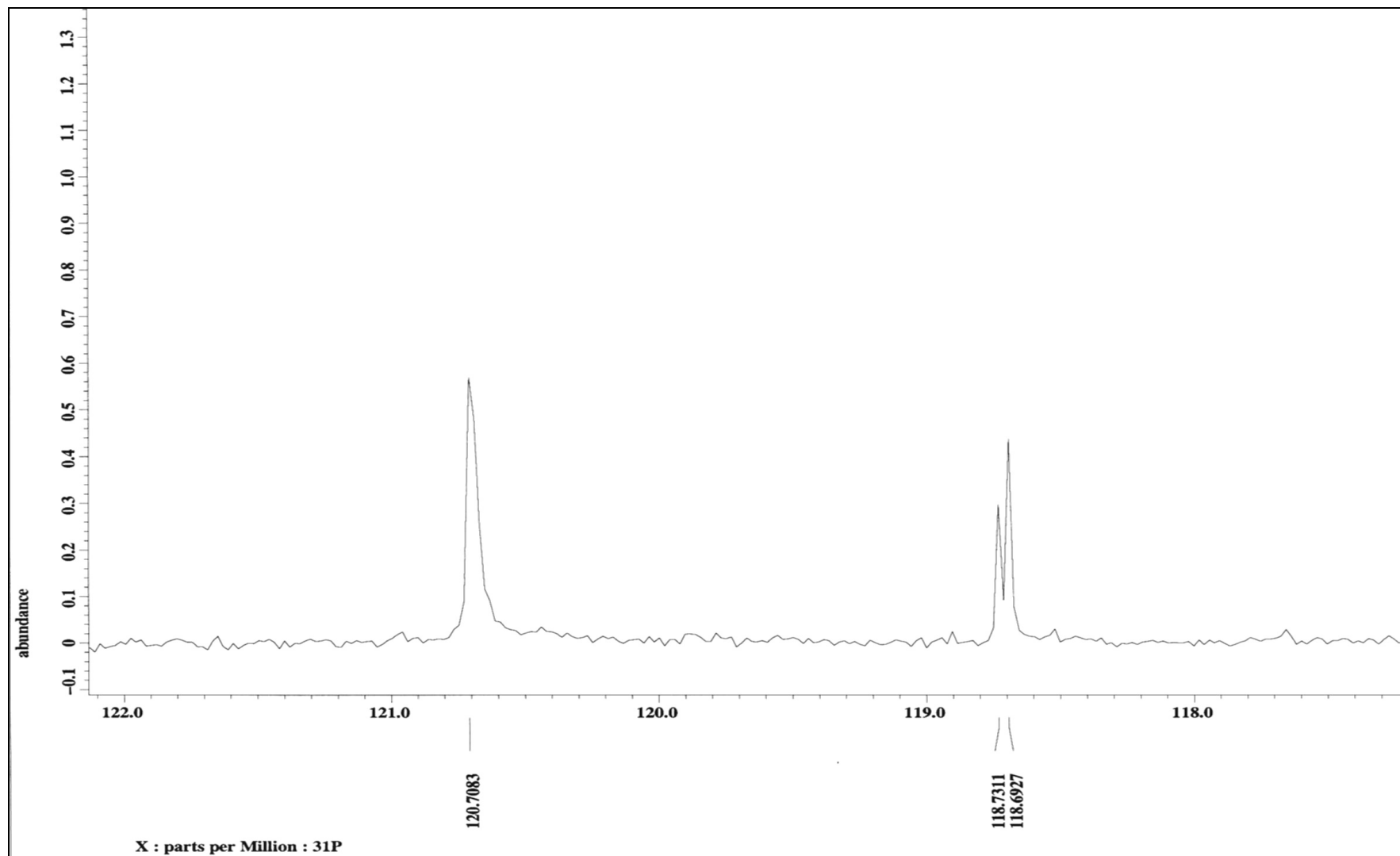
$^{31}\text{P}$  NMR spectrum of  $[\text{CpCr}(\text{Se}_2\text{P}(\text{O})\text{Ph})_2]$  (**24**)



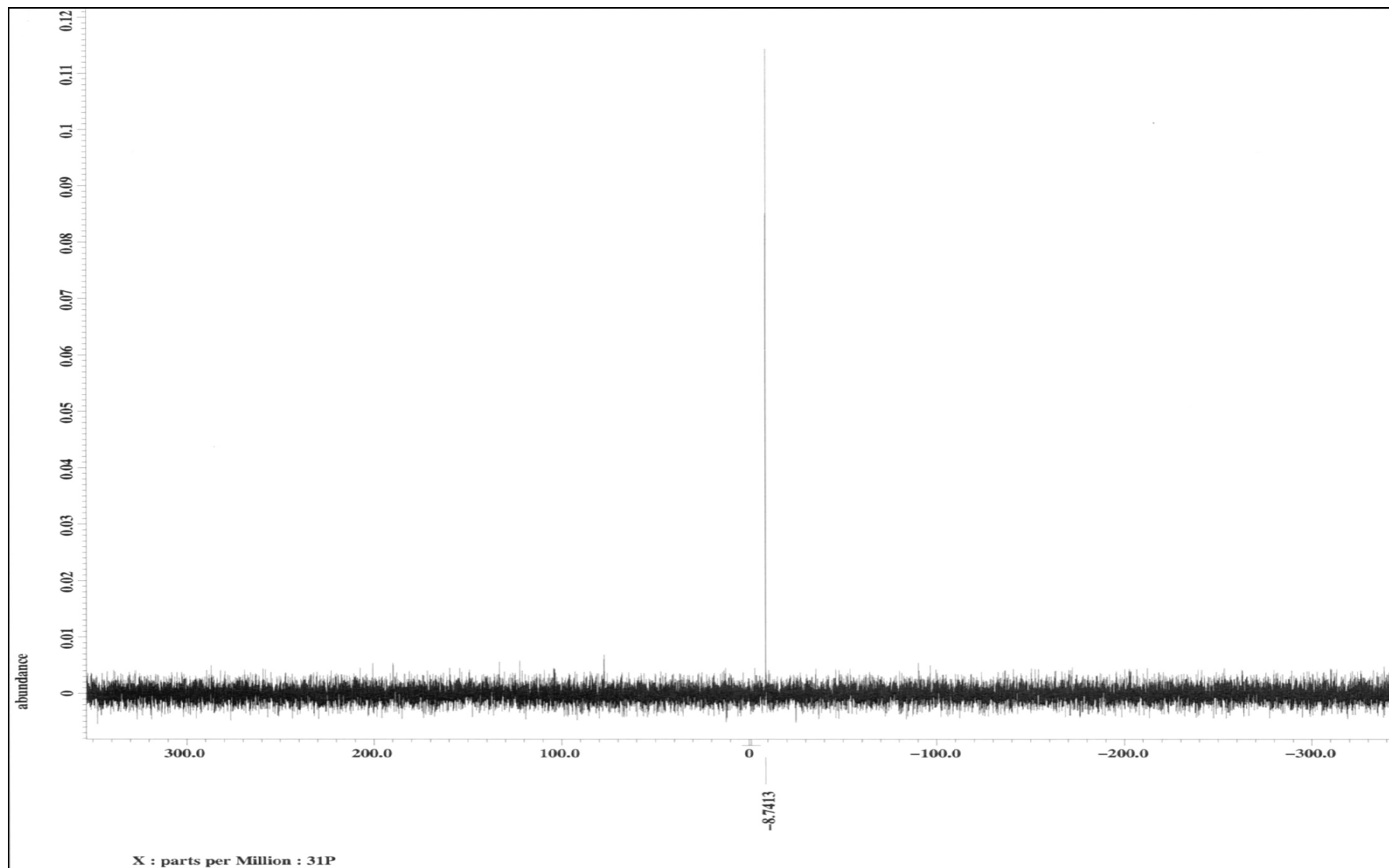
$^{31}\text{P}$  NMR spectrum of  $\text{Cp}_3\text{Mo}_3(\text{CO})_4[\text{Se}_3(\text{PPh})_2]$  (**27a**)



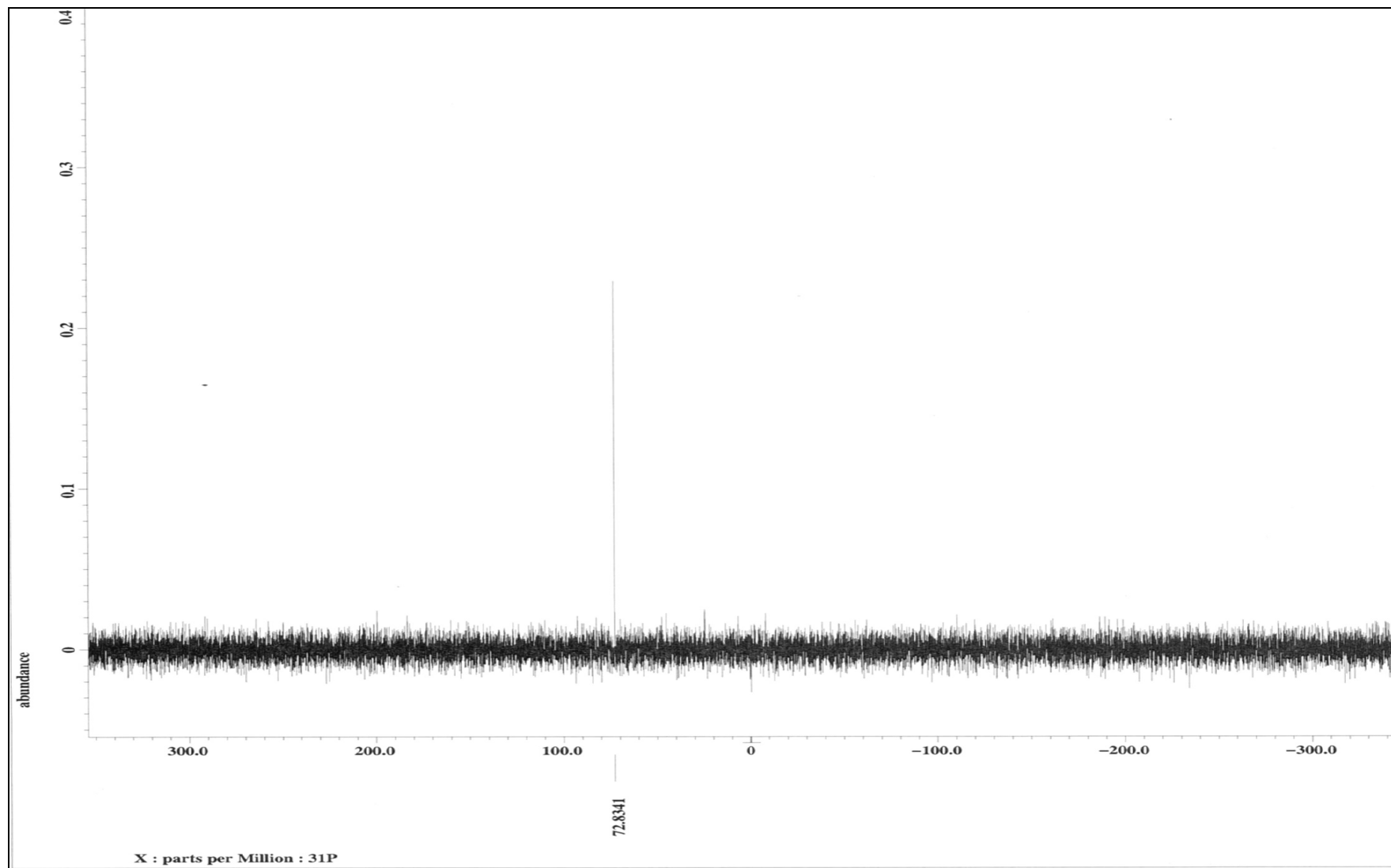
$^{31}\text{P}$  NMR spectrum of  $\text{Cp}_3\text{Mo}_3(\text{CO})_4[\text{Se}_3(\text{PPh})_2]$  (**27b**)



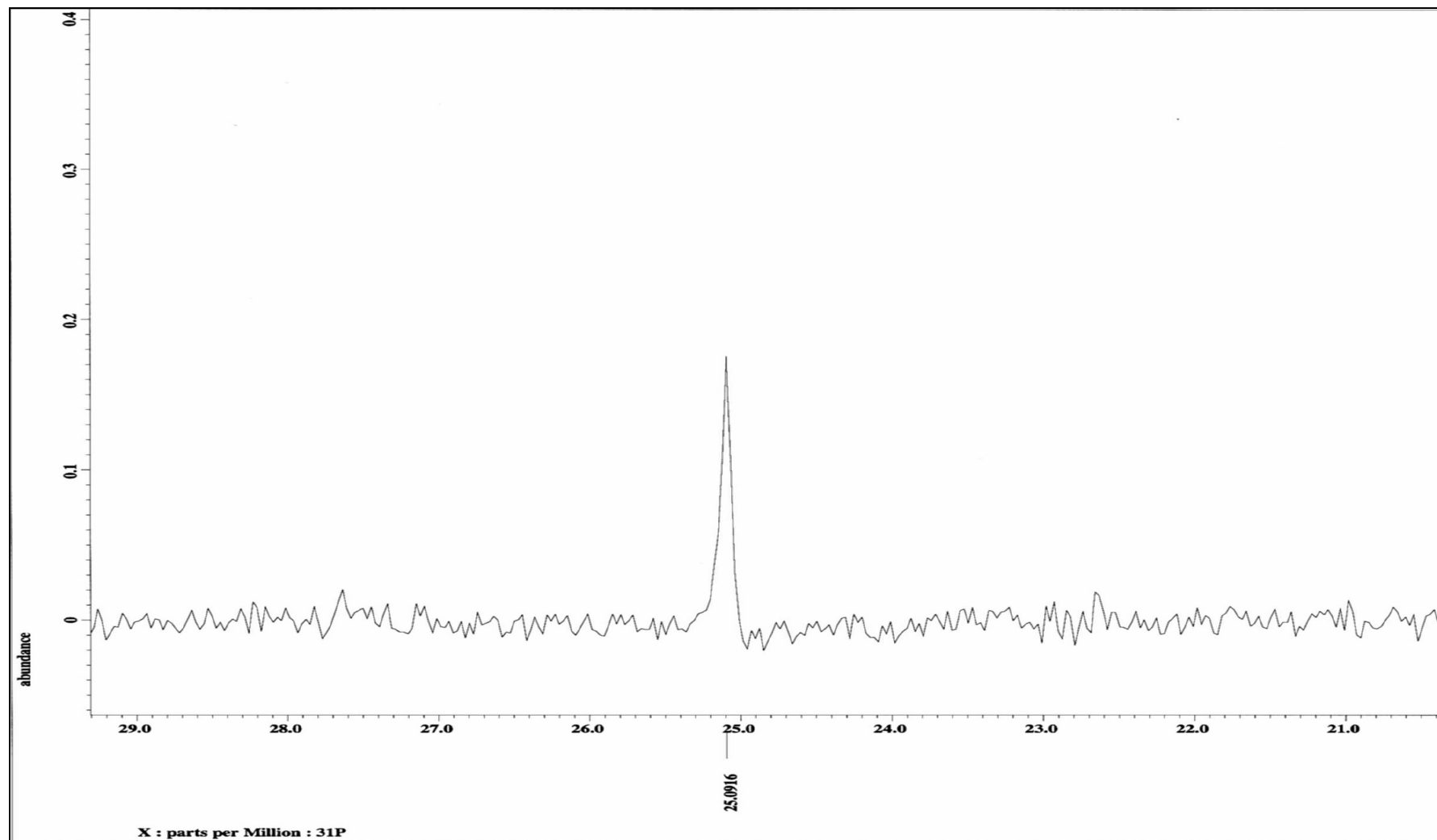
$^{31}\text{P}$  NMR spectrum of  $[\text{CpCr}(\text{CO})_2\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}p)_3\}_2][\text{CpCr}(\text{CO})_3]$  (**28**)



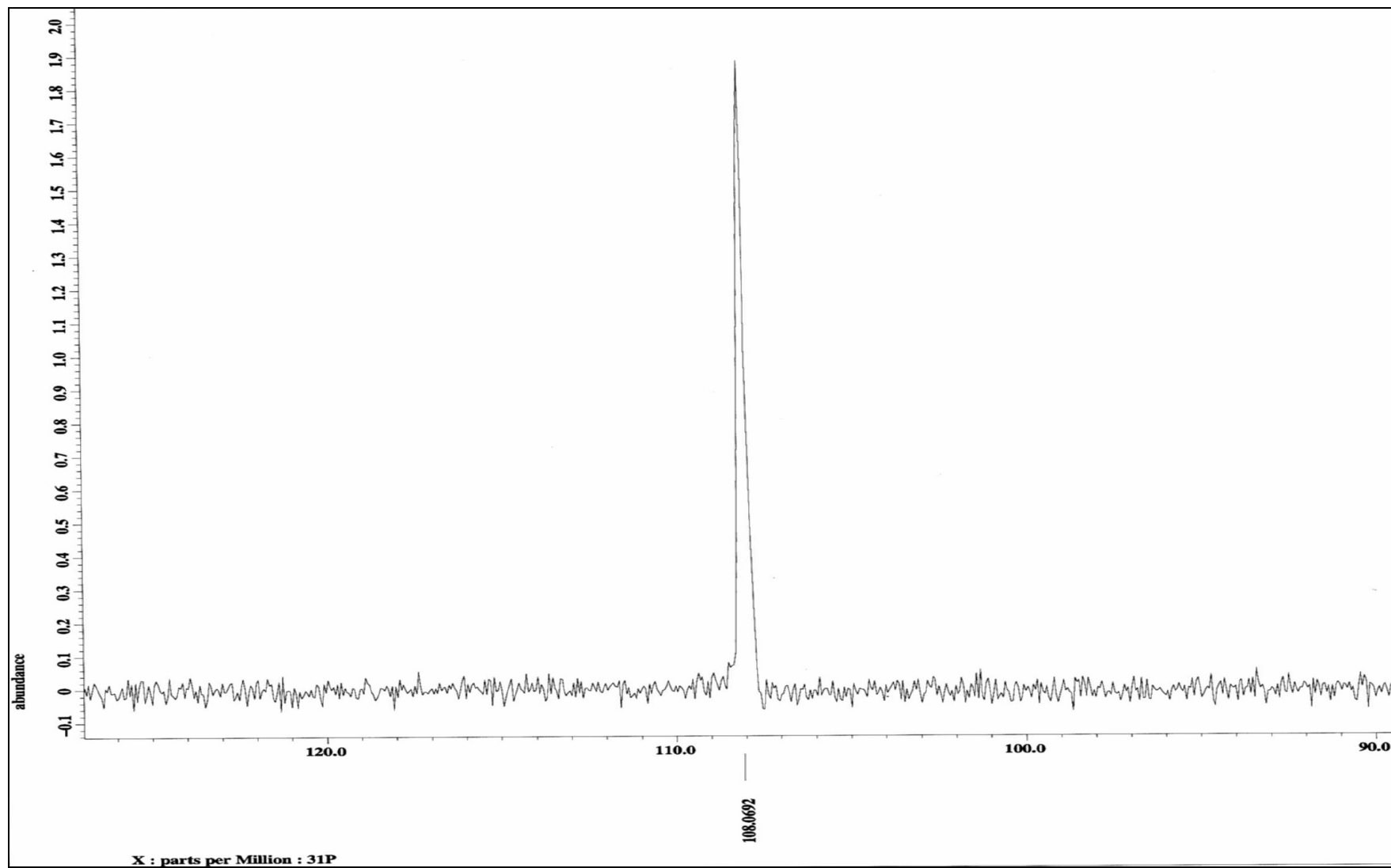
$^{31}\text{P}$  NMR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})_5\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}p)_3\}_2]$  (**29**)



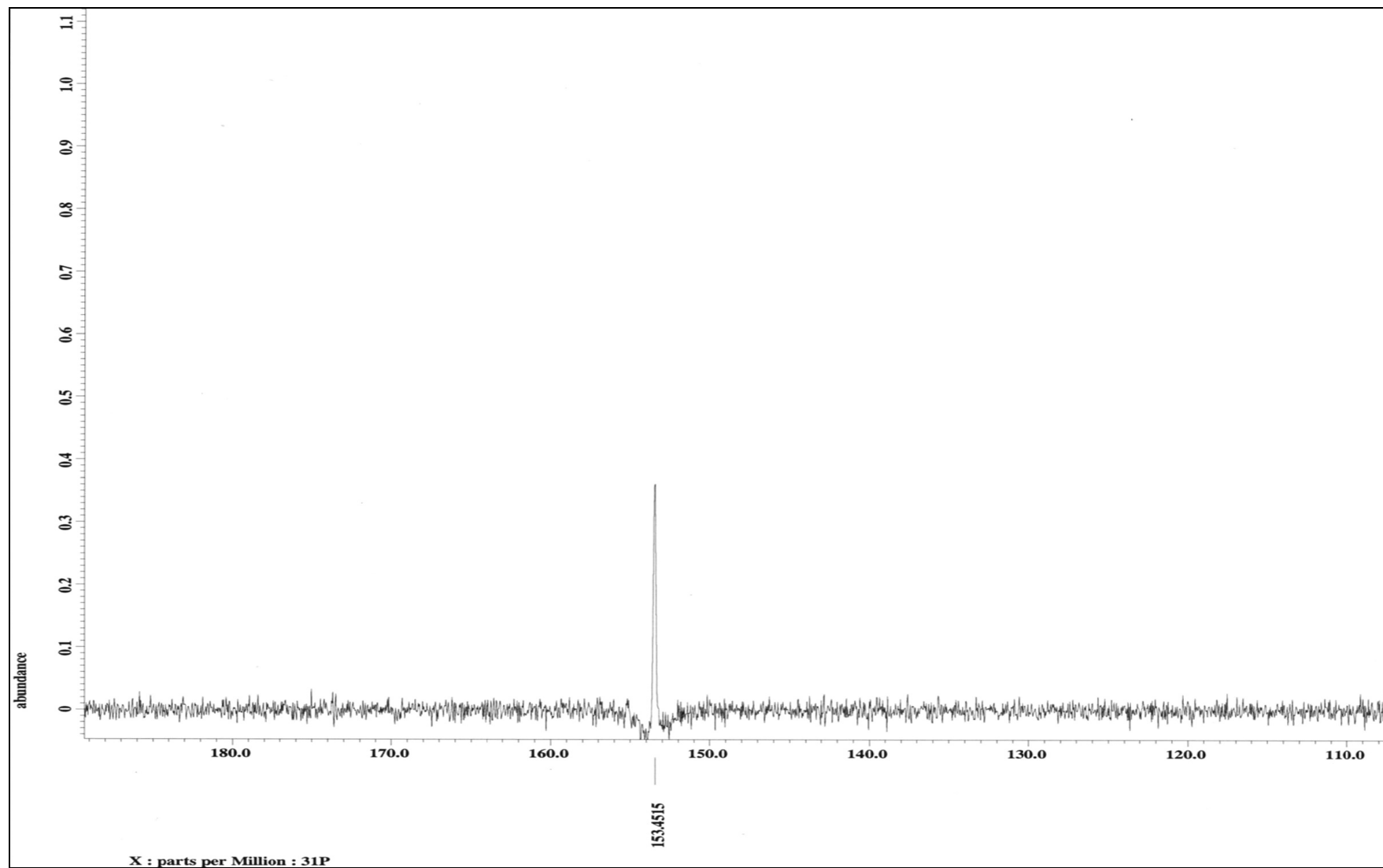
$^{31}\text{P}$  NMR spectrum of  $\text{Cp}_2\text{Mo}_2(\text{CO})(\mu\text{-CO})_2\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}p)_3\}$  (**30**)



$^{31}\text{P}$  NMR spectrum of  $\text{CpCr}(\text{CO})_2(\mu\text{-C}_6\text{H}_4\text{S})\text{PPh}_2$  (**32**)

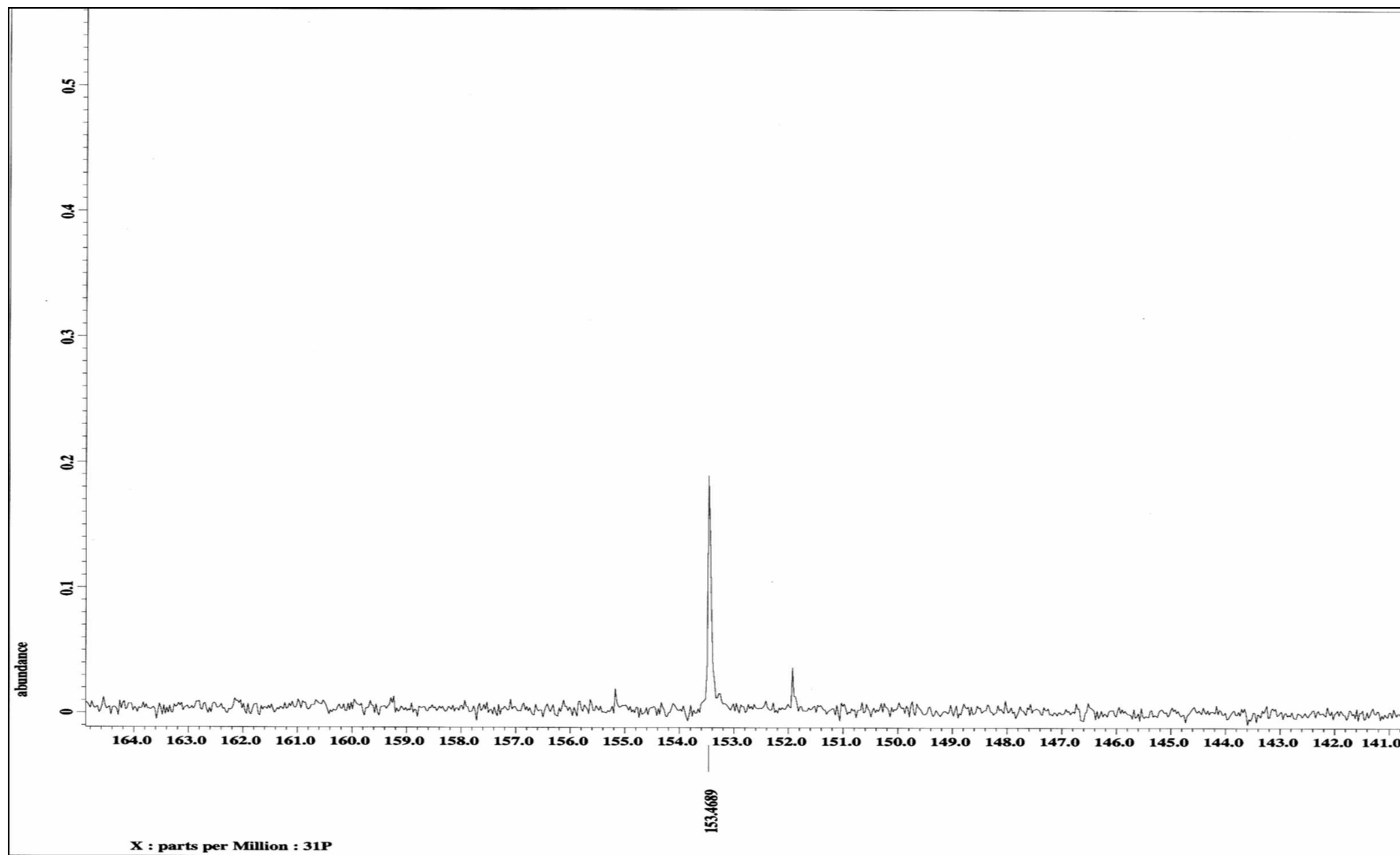


$^{31}\text{P}$  NMR spectrum of  $[\text{Cp}_2\text{Cr}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2\text{PPh}\}]$  (**33**)

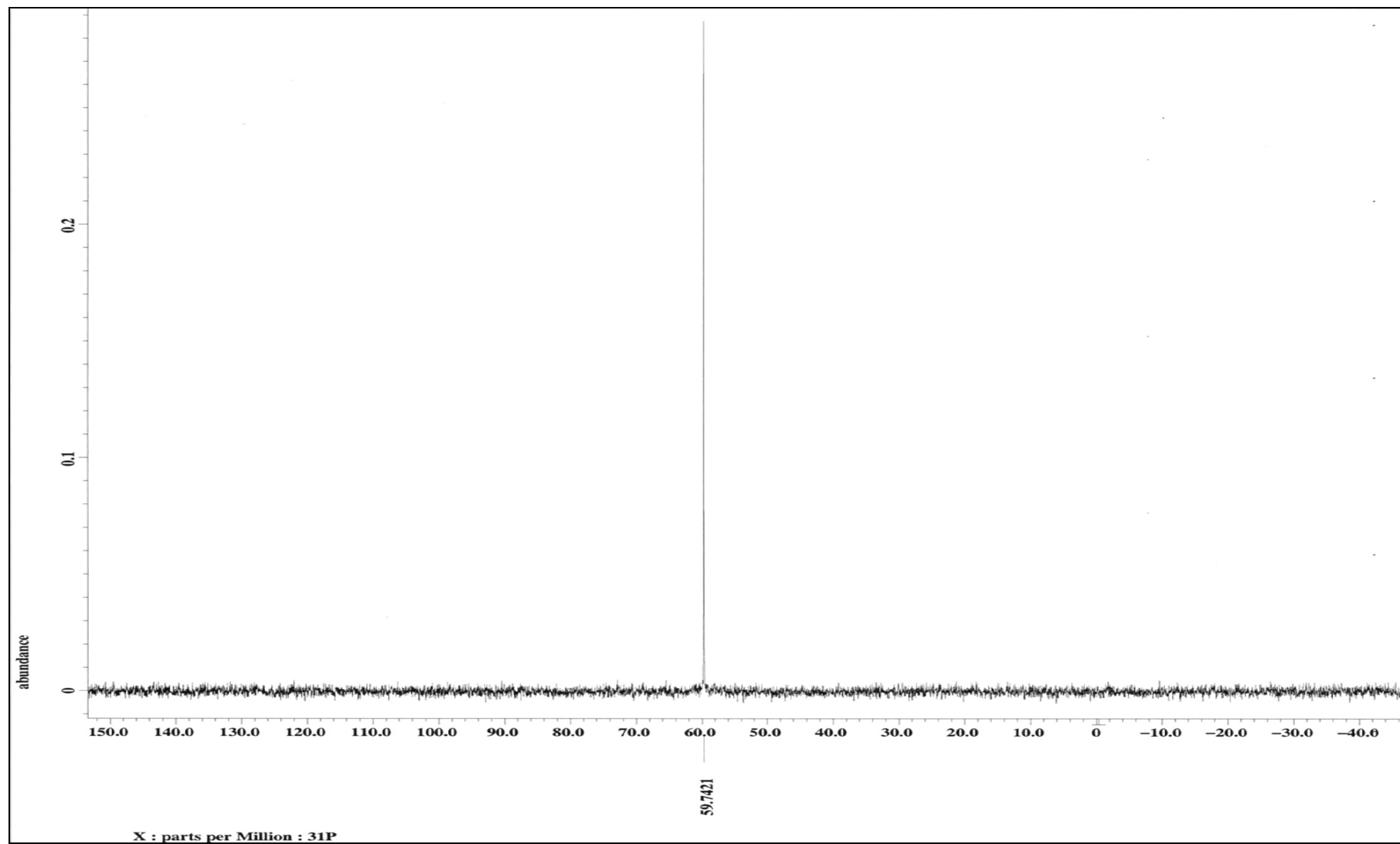




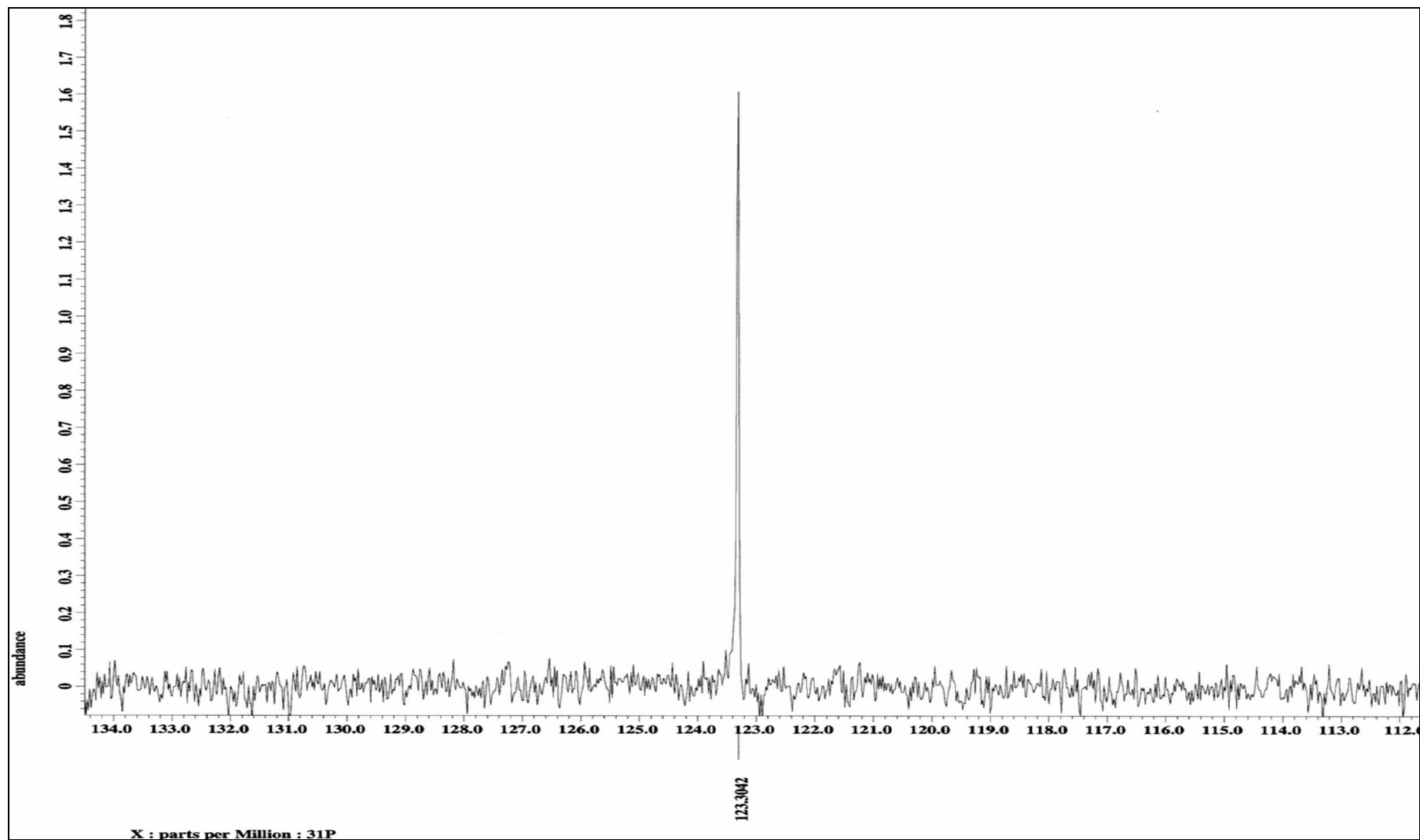
$^{31}\text{P}$  NMR spectrum of  $[\text{Cp}_2\text{Cr}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SMe-}o)\text{P}\}]\textbf{(35)}$



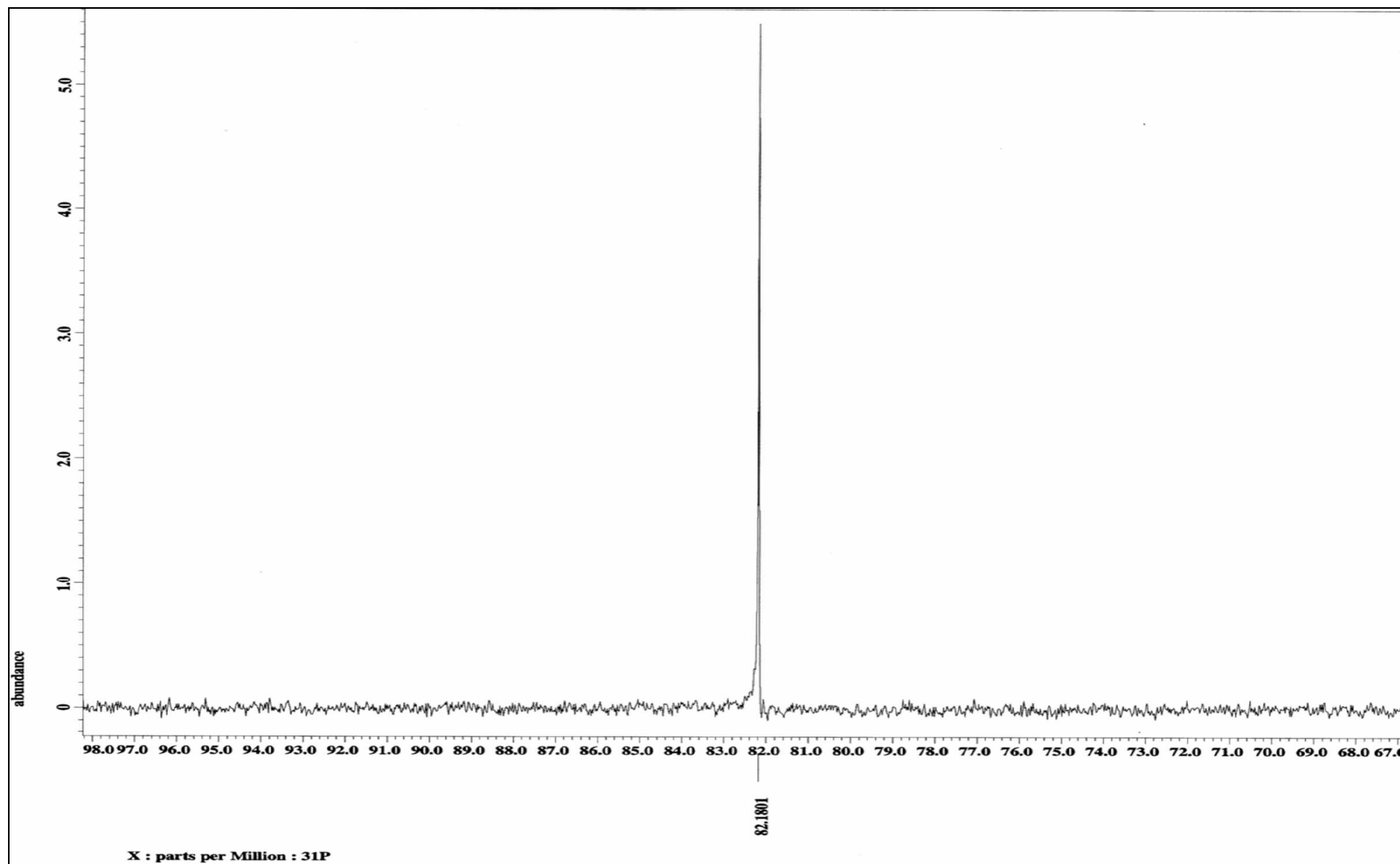
$^{31}\text{P}$  NMR spectrum of  $\text{CpMo}(\text{CO})_2(\mu\text{-C}_6\text{H}_4\text{S})\text{PPh}_2$  (**36**)



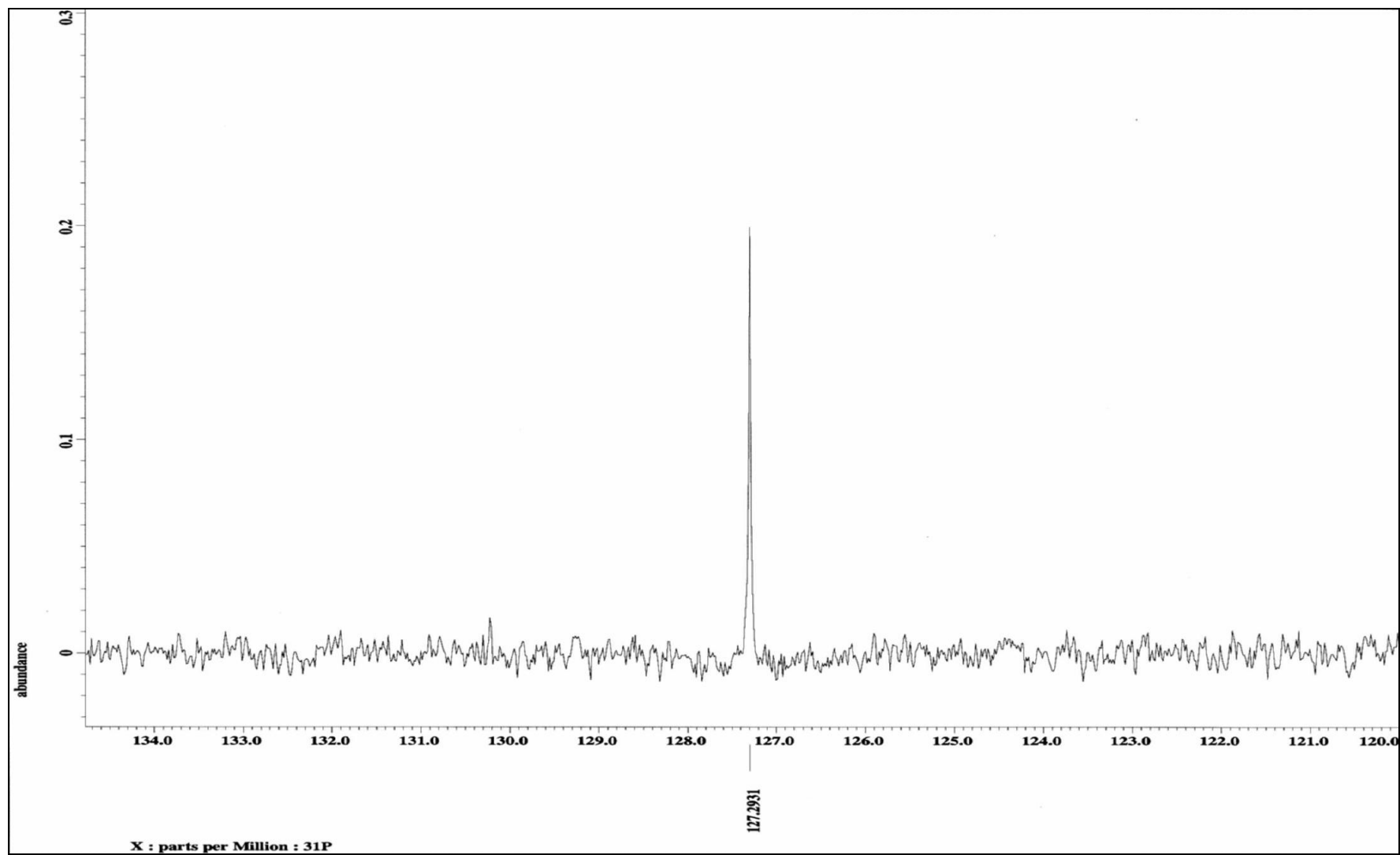
$^{31}\text{P}$  spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})\{\mu\text{-C}_6\text{H}_4\text{S}_2\text{PPh}\}]$  (**38**)



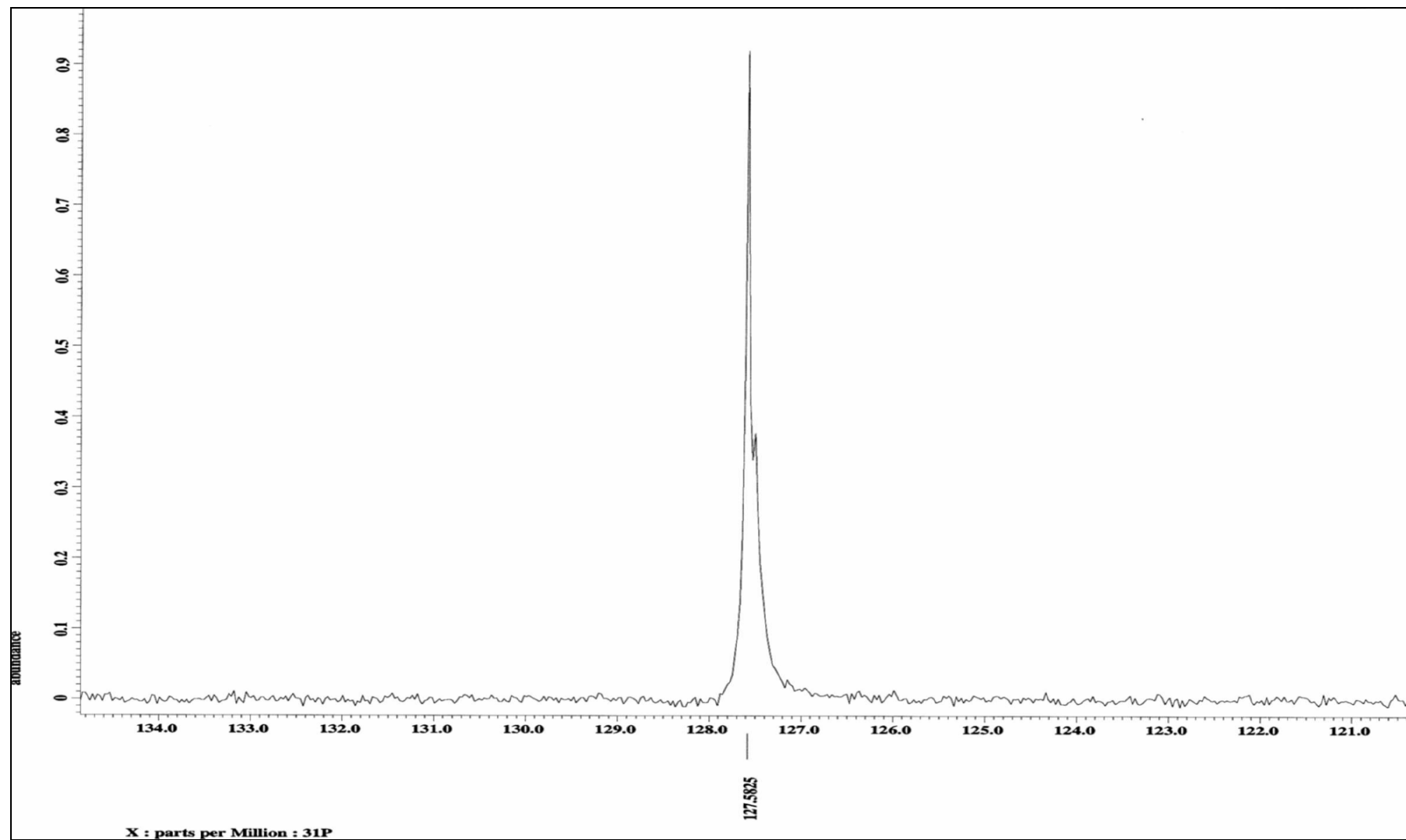
$^{31}\text{P}$  NMR spectrum of  $\text{CpMo(CO)}\{(\mu\text{-C}_6\text{H}_4\text{S})(\mu\text{-C}_6\text{H}_4\text{SMe})\text{PPh}\}$  (**39**)



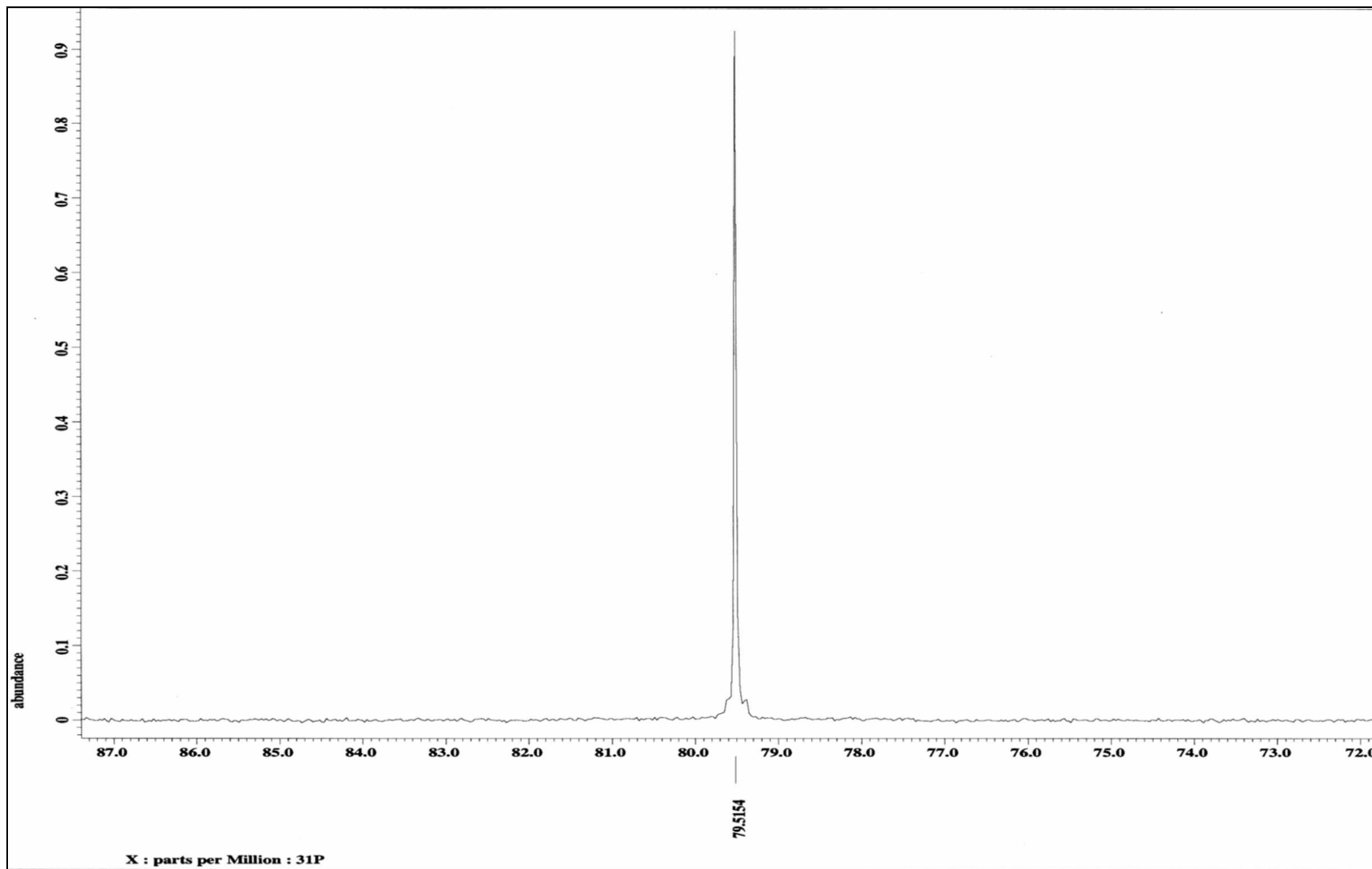
$^{31}\text{P}$  NMR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SCH}_2)\text{P}\}]$  (**40**)



$^{31}\text{P}$  NMR spectrum of  $[\text{Cp}_2\text{Mo}_2(\text{CO})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SMe-}o)\text{P}\}]$  (**41**)



$^{31}\text{P}$  NMR spectrum of  $\text{Mo}(\text{CO})_3\{\text{P}(\text{C}_6\text{H}_4\text{SMe-}o)_3\}$  (**42**)



$^{31}\text{P}$  NMR spectrum of  $\text{CpMo}_2(\text{CO})_3(\mu\text{-S})\{(\mu\text{-C}_6\text{H}_4\text{S})_2(\text{C}_6\text{H}_4\text{SMe-}o)\text{P}\}$  (**43**)

